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ICTs Readiness among MOOC Learners: A Cross-National Analysis

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ICTs Readiness among MOOC Learners: A Cross-National Analysis

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Dedication

I dedicate my dissertation work to my wonderful wife, Dina, for her endless love and support throughout the doctoral journey; and for always encouraging me to pursue my dreams.

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ICTs Readiness among MOOC Learners: A Cross-National Analysis

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Massive open online courses (MOOCs) attract the attention of educators who desire to extend higher education to learners around the globe. MOOCs also interest learners with Internet access who can benefit from them and enroll at no cost. However, research indicates the importance of learners' readiness for online learning in order to take advantage of these courses and the importance of investigating factors that influence learners' satisfaction with MOOCs. In order to examine these aspects, two different types of surveys were conducted. Framed by the second-level digital divide approach and resources and appropriation theory, this study surveyed MOOC learners to investigate their readiness for online learning. It measured learners' levels of engagement with information and communications technologies (ICTs) and learners' characteristics (self-efficacy and locus of control). The study analyzed one source of data collected from surveying 2,882 learners who were enrolled in any of five MOOCs that were offered in either English or Arabic and through two MOOC providers based in the U.S. and Saudi Arabia. The findings identified significant differences among learners who live in various regions or countries with different economic classifications. For example, MOOC learners who live in either North America or developed economies have significantly higher levels of engagement with ICTs, self-efficacy, and locus of control than learners

who live in Arab States or developing economies respectively. In several regions, such as North America and Asia and the Pacific, male MOOC learners have significantly higher levels of engagement with ICTs than females. Additionally, based on the theory of independent learning and teaching, the three types of interaction model, and the technology acceptance model, this study investigated factors that influence learners' satisfaction with MOOCs. It also examined effects of age and level of education of MOOC learners on their perceptions concerning the importance of five course aspects. Another survey asked 1,762 learners who were enrolled in any of four MOOCs. The results showed that the learner perceived usefulness, teaching and learning aspects of the MOOC, and learner-content interaction as important satisfaction factors. The results revealed that both age and level of education have significant effects only on the importance of three course aspects. Future directions in MOOCs research are discussed.

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Chapter 1: Introduction

Massive open online courses (MOOCs) are tuition-free courses that are taught to a large number of learners over the Internet. Although MOOCs are not new to curriculum design, they are attracting increased scrutiny and attention in higher education. Several elite universities in the U.S. and elsewhere started to offer MOOCs either through a partnership with MOOC providers or on their own websites (Pappano, 2012; Vardi, 2012). These MOOCs are available globally for any learner with Internet access. According to Grainger (2013), although higher education institutions are known for delivering online content, MOOCs have captured the attention of the press and public in a way that only a few educational initiatives have in the past. MOOCs have attracted a lot of praise as well as uncertainty. Grainger (2013) indicated several benefits of MOOCs, such as widening access to educational content and field-testing new pedagogical methods. He noted that because MOOCs offer learners around the globe open and free access to educational content, higher educational institutions (HEIs) can utilize MOOCs to widen access to their educational content. Furthermore, MOOCs are attracting more attention to online course development. This, in turn, gives HEIs the chance to investigate new pedagogical methods, course designs, and delivery formats, which could influence both online and on campus programs. On the other hand, MOOCs are highly criticized for their poor learner retention rate (Daniel, 2012). Scholars critique the MOOCs' uncertainty in important issues related to engagement and pedagogical design such as interaction, scalability and assessment (Lewis, 2014; Mazoue, 2013).

Allen and Seaman (2015) noted that MOOCs share several characteristics with regular online courses offered by universities; however, MOOCs are different from these courses in that: MOOC learners are not registered students at the university; MOOCs are

tuition-free courses designed for open access and unlimited enrollment and participation via the Internet; and typically MOOC learners do not receive credit for the completion of the MOOC. Chattopadhyay (2014) also mentioned other differences: MOOCs require additional sets of digital skills beyond the ones needed for taking courses online; they require online facilitation and collaboration skills. Participation is a two-way process and learners are considered students as well as creators; and online courses are considered closed ended as they have well-defined start and end points. However, in a typical MOOC, learning is not limited to a certain digital space as learners participate, collaborate, and share their experience through different platforms, such as social networking sites, or through holding online chatting sessions or offline meetings.

The rapid diffusion of information and communication technologies (ICTs) has encouraged very large numbers of universities to develop and offer online courses and programs (Lee, 2010). According to recent studies, the number of online courses has increased substantially. Allen and Seaman (2013, 2014, 2015) noted that, in the U.S., the number of students taking at least one online course has reach 7.1 million in the fall of 2012, in comparison with only 1.6 million in the fall of 2002. Eight percent of institutions offered a MOOC in 2014, compared to only 2.6 percent in 2012. Additionally, in the Arab region, Mirza and Al-Abdulkareem (2011) mentioned that several governments established various online programs for several educational levels. Also, two platforms offering MOOCs in Arabic were launched; one is based in Saudi Arabia and the other one in Jordan (Curley, 2013).

STATEMENT OF THE PROBLEM

MOOCs draw on developments in ICTs, and online and distance education, but the MOOC market is still in the developing stage (Klobas, Mackintosh, & Murphy, 2015), and "a sustainable configuration of individual, institutional, and commercial providers is yet to emerge" (p.18). The authors mentioned that although very large numbers of learners around the globe have enrolled in MOOCs, very little is known about learners' "motivation, their experience as learners, their satisfaction with their experience, what they learn, what works, and what does not work" (p. 19). Additionally, Ronaghi, Saberi, and Trumbore (2015) point out that MOOCs gave educators the chance to extend social learning through connecting learners across the globe and engaging them with the practical use of technology and design. However, more research is needed to look at how MOOC educators can "use the emerging cultural practices of [the] online learning community to design more effective online teaching practices … [and] provide real-time support to learner based on predictive models of behavior" (p. 104). According to Kim (2015), MOOCs are an essential, new educational innovation with the capacity of having a large impact, but educators are still trying to find out the best way to use them.

Many scholars have discussed the importance of investigating learner readiness for online learning. Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, and Marczynski (2011) noted that with the continued increase of the offered online courses, understanding learner readiness for e-learning is very important. The authors argued that this can be accomplished by understanding learner characteristics and ICTs engagement. Several studies have looked at learner readiness for taking a course online (e.g. Kaur & Zoraini Wati, 2004; Keramati, Afshari-Mofrad, & Kamrani, 2011; Smith, 2005), but they were limited by surveying students from one or just a few colleges or students from one or a few countries. Learners who participated in these studies are different from MOOC

learners, as the latter have a wider range of differences in terms of age, level of education, ICTs infrastructure of the country born or resident in, English fluency, or income.

In an ever more globalized world, learners from different nationalities enroll in the same courses (Arenas-Gaitán, Ramírez-Correa, & Rondán-Cataluña, 2011). Therefore, designing and implementing online learning systems in a multi-cultural environment is a major challenge for tertiary educational institutions, as it is essential for them to consider multi-cultural issues while designing these educational systems. Guo and Reinecke (2014) said that the current generation of MOOCs attract learners from different countries; however, very little is known about MOOC learner readiness for online education across countries and varied cultures, as many of the recent studies focused mainly on learners enrolled in regular online courses offered by universities in the same country (e.g. Atkinson & Blankenship, 2009; Aydın & Tasci, 2005) or in two different countries only (e.g. Brahmasrene, & Lee, 2012; Smith, Murphy, & Mahoney, 2003). In 2013, one of the main MOOC providers in the U.S. announced a partnership with a foundation in the Arab States region to develop a MOOC platform that offers MOOCs in Arabic (Hazlett, 2013). The plan for the new platform is to offer Arabic translations of some of the courses offered through the U.S. MOOC platform and develop new courses taught by Arab faculty members and professionals (Hazlett, 2013). This initiative considers English proficiency limitation, as some of the learners in the Arab States might not be confident enough to learn through MOOCs offered in English. However, this initiative did not look at learners' readiness for online learning with regard to their levels of engagement with ICTs, self-efficacy and locus of control. According to Hannon and D'Netto (2007), learners from different cultures vary in their ability to utilize online learning technologies. Previous studies (Lim, 2004; Mueller & Thomas, 2000)

show that cultural differences can contribute to learners' self-efficacy and locus of control. However, these studies were limited to examining university students or learners from two countries only. Therefore, this study examines similarities and differences among MOOC learners from different regions or country classifications in terms of levels of engagement with ICTs, self-efficacy, and locus of control and focuses on learners who are enrolled in MOOCs offered by providers based in the U.S. and Arab States.

According to Parrish (2005), learner experiences emerge from the way learners interact with the content and instructors, the way they respond to activities and instructional methods, and the setting in which interaction and learning occur. Additionally, interaction has been cited as an important component of e-learning and distance education programs (Mahle, 2007). A study conducted by Gao and Lehman (2003) examined several levels of interaction in online courses and found that interaction had a positive effect in learner motivation and success. In the case of MOOCs, this interaction takes place mainly online. Although MOOCs offer learners numerous opportunities to increase their knowledge in fields of their interest and learn more about other fields that they have very little knowledge about, MOOC learners face educational challenges (Ghobrial, 2013) while interacting with the content, instructors, and other learners. Understanding the successes and obstacles the learners experience with online learning can assist online learning researchers, designers, and providers to refine and enhance open online learning (Veletsianos, 2013). However, since the MOOC is a recent educational innovation, there is limited quantitative research that addresses learner experience and satisfaction with MOOCs. Therefore, this study investigates MOOC features that learners consider important and significantly influence their satisfaction with MOOCs.

Based on data released recently by one of the MOOC providers, Newman and Oh (2014) reported that the majority of MOOC learners are male and already have college degrees. In addition, the median age of MOOC learners is 24 years old. These findings are important because understanding the role of learner demographics in online learning can help institutions make decisions concerning online program offerings (Colorado & Eberle, 2010). For instance, learners who succeed in traditional learning settings might not do well in an online learning environment due to learner motivation, self-discipline, or other characteristics (Wood, 2005). Research studies, indeed, have identified similar learner demographics that could potentially influence learning from online courses. Some of these demographics are age, work status, family status, and educational background (Guri-Rosenblit, 1999; Moore & Kearsley, 2011; Tsay, Morgan, & Quick, 2000). Similar to online learning, it is important for educators and educational institutions to understand the association between MOOC learners' demographics and the types of online interaction and learning aspects of the MOOC they consider essential. Sanchez-Gordon and Luján-Mora (2013) looked at web accessibility barriers that could hinder full online participation by elderly learners, but their research was a preliminary study that analyzed a limited number of MOOCs. Due to MOOCs recent adoption, there is limited research on MOOC learners' demographics and their preferences for online interaction. Quantitative research is beginning to collect and analyze data related to the effectiveness and user preference for particular MOOC design elements. Hence, this study surveys MOOC to examine the association between learners' age and highest level of education and their perceptions regarding the importance and value of several course aspects, thus contributing to emerging research related to the effectiveness and user preference in demographic contexts.

PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

For individuals, MOOCs present a new opportunity to be part of an online learning community and their low barrier to entry encourages those who may lack the ability to attend classes or cannot afford more traditional college opportunities (Thompson, 2011). However, one of the questions about MOOCs is that to what extent those individuals are ready for them. Akaslan and Law (2011) argue that success in an online learning environment depends on a cluster of factors and readiness is among the important ones. Dray et al. (2011) noted that investigating learner readiness for online learning can be accomplished by assessing learner level of engagement with ICTs and understanding learner characteristics; this will be achieved in this study by measuring MOOC learner engagement with ICTs, self-efficacy, and locus of control.

This research is based on data collected from learners who enrolled in MOOCs offered in English and Arabic. The English MOOCs are offered by The University of Texas at Austin through the MOOC provider *edX*, which is based in the U.S. The Arabic MOOCs are offered by Arab professors and professionals through the MOOC provider *Rwaq*, which is based in Saudi Arabia. By integrating the second-level digital divide approach and resources and appropriation theory, this study explores questions of how the digital divide in different regions can predict learners' different levels of engagement with ICTs. Based on the above-mentioned factors, the following research question is asked:

> RQ1: What are the similarities and differences among MOOC learners from different regions or country classifications in terms of levels of engagement with ICTs, self-efficacy, and locus of control?

Female students at some universities in the Arab region are not allowed to be on campus after the working hours or during weekends, and therefore have limited chances to make the best use of online courses offered via efficient on-campus Internet connections (AlMegren, & Yassin, 2013; Bhatti, El-Qawasmeh, & Tubaisahat, 2005). Therefore, this study poses the following research question:

RQ2: To what extent does gender moderate the relationship between region and MOOC learner ICTs engagement or between country classification and MOOC learner ICTs engagement?

Based on the Measuring the Information Society Report (ITU, 2014), in 2008 the IDI was developed by the International Telecommunication Union (ITU) as it is not possible for a single indicator to track down the progress in all components of the ICT development process. The purpose of the IDI is to capture the development of the information society throughout its different stages. The main objectives of the IDI are measuring: the level and evolution of ICT developments in countries over time; progress in ICT development in developing and developed countries; the digital divide described as the differences between countries with regard to their levels of ICT development; and the extent to which countries can utilize ICTs to increase growth and development based on existing skills and capabilities. The conceptual framework of the IDI can be depicted through a three-stage model: ICT readiness, ICT intensity, and ICT impact. The first stage (ICT readiness) reflects the level of network infrastructure and access to ICTs. The second one (ICT intensity) reflects the level of use of ICTs in the society. The third stage (ICT impact) reflects the outcome or result of effective and efficient ICT use. According to the Measuring the Information Society Report (ITU, 2014), there are six ITU Telecommunication Development Bureau (BDT) regions: Africa, Americas, Arab States,

Asia and the Pacific, Commonwealth of Independent States (CIS), and Europe. This study will analyze the data based on these regions. Consequently, this study poses the following research question:

RQ3: How does the IDI mediate the differences in online learning readiness among MOOC learners from different regions?

Furthermore, Rhema and Miliszewska (2010) noted that language is another significant barrier in adopting online learning in developing countries. Elzawi and Wade (2012) noted that the lack of online resources with educational material in the Arabic language is another reason for a relatively low adoption rate of online learning in the Arab region. In Libya, for example, Arabic is the official language and English proficiency is low (Elzawi & Wade, 2012). At the same time, the majority of the learning resources, such as important Web content, freeware, and software, are in English. Therefore, the majority of people in Libya cannot utilize these resources; it is very challenging to integrate online material in the Libyan education system. Lack of online educational material in Arabic is partially because many of the faculty members might not have the skills needed to create such material (Georgina & Olson, 2008). Thus, this study poses the following research question:

RQ4: In the Arabic survey, to what extent do MOOC learner English proficiency, computer access, and Internet access predict their ICTs engagement?

The majority of college students expend considerable amounts of time, effort and money, which place a high value on their higher education experiences (Knox, Lindsay, & Kolb, 1993). However, it is additionally important for students not only to value these

experiences, but also to be satisfied with them. According to Astin (1993), learner satisfaction refers to his/her perception of the college experience as well as the perceived value of the education received while enrolled in an educational institution. Satisfaction is a significant "intermediate outcome" (p.278), as it affects a student's level of motivation (Donohue & Wong, 1997) and is a predictor of retention (Astin, 1993; Edwards & Waters, 1982). Bean and Bradley (1986) found that for college students, satisfaction had a greater impact on their performance than performance had on their satisfaction. Accordingly, the satisfaction of college students can be one of the main predictors of their academic success. Therefore, with the increase in number of MOOCs offered and enrolled learners, it has become important to examine the factors that influence learners' satisfaction with these online courses. As the literature shows, researchers have studied factors that influence learner satisfaction with online learning, but very limited research is available on learner satisfaction with MOOCs. Also, as mentioned earlier, although MOOCs are considered a form of distance education (Romiszowski, 2013), they are different from online courses that universities have been offering for decades (Kim, 2013; "MOOCs - online education, 2012"). Based on the above-mentioned research, this study poses the following two research questions:

RQ5: What MOOC features significantly influence online learners' satisfaction?

RQ6: What MOOC features are considered important and satisfactory to online learners?

This research aims also to examine the association between learners' demographics and the types of online interaction they consider important. It will examine the association between learner age and highest level of education and the types of interaction (interaction with the teaching staff, other learners, or course content) the

learner considers important. It will also discuss factors that might influence learner preference in terms of being responsible for his/her own learning and accessing online learning resources after the course ends. The impetus for this research comes from previous research investigating the role of learner demographics (Moore & Kearsley, 2011; Guri-Rosenblit, 1999; Tsay, Morgan, & Quick, 2000) and the different types of interaction in online learning (Anderson, 2003). It takes advantage of the theoretical framework and studies in the areas of communication and characteristics of distance education learners, important forms of interaction in formal learning, and distance learning (Anderson, 2003; Holmberg, 1985; Knowles, 1980). Based on the foregoing, the following research questions are asked:

RQ7: To what extent does the age of MOOC learners influence their perception of the importance of online interaction with the teaching staff or feeling supported by other learners after controlling for hours spent per week and confidence in learning online?

RQ8: To what degree does the age of MOOC learners influence their perception of the importance of being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online?

RQ9: To what extent does MOOC learners' level of education influence their perception of the importance of online interaction with the teaching staff or feeling supported by other learners after controlling for hours spent per week and confidence in learning online?

RQ10: To what degree does MOOC learners' level of education influence their perception of the importance of being responsible for their own learning,

accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online?

Chapter 2: Literature Review and Theoretical Framework

OVERVIEW OF MOOCS

Massive open online courses (MOOCs) are courses taught online, typically at no cost, and to thousands of learners (Pappano, 2012). The author noted that the course design in MOOCs, in terms of presenting the material and organizing the interactivity, is quite essential. Pappano (2012) explained that due to the large number of learners enrolled in each MOOC, faculty members cannot possibly respond to learners individually. According to Johnson and Becker (2015), the term MOOC was coined by Stephen Downes and George Siemens in 2008, but only became a popular term in 2012. Since then, MOOCs have gained public attention and several world-renowned universities and start-ups founded MOOC platforms. For instance, Harvard University and the Massachusetts Institute of Technology (MIT) founded edX, Stanford University founded Coursera, and an innovative start-up founded the platform Udacity. Johnson and Becker (2015) said that at the time of publication, Udacity and edX had reached 1.75 million learners, across 30 and 60 courses, respectively. Coursera had reached more than four million learners across 400 courses. Also, most of the MOOC learners are between 26 and 45 years old and have high levels of education (Daniel, Cano, & Cervera, 2015).

Johnson and Becker (2015) noted that three major MOOC platforms, edX, Coursera, and Udacity, have invested a lot of money and effort developing high standard proprietary content. These platforms have been developing several forms on machine intelligence to assess student performance. The major MOOC projects have almost the same social structure, with learners participating in online forums and study groups. Some of the MOOCs offered by Coursera and Udacity organize learner meet-ups.

Since MOOCs are open and online, they can be used as open educational resources (OERs) in a traditional classroom-based course (Klobas, Mackintosh, & Murphy, 2015). The authors argue that this approach can help transform classroom-based courses into blended learning courses; the face-to-face learning part can happen in the classroom and the online part can take place in the MOOC (Klobas, Mackintosh, & Murphy, 2015).

According to Klobas, Mackintosh, and Murphy (2015), the capacity of MOOCs to accommodate tens of thousands of learners is far beyond the number of learners who had participated in online courses prior to MOOCs. The authors noted that this capacity reflects developments in information and communication technologies (ICTs), which include: infrastructure, programs, and services to store and remotely access huge amounts of digital content, such as online videos, books, and digital libraries; also included are secure registration of large numbers of learners, which allows thousands of learners to access the webpages and media simultaneously. MOOC technology appears scalable, as MOOCs accepts all learners who wish to register (Klobas, Mackintosh, & Murphy, 2015). Johnson and Becker (2015) also mentioned that

> Designed to provide high quality online learning at scale to people regardless of their location or educational background, MOOCs have been met with enthusiasm because of their potential to reach a previously unimaginable number of learners. The notion of thousands and even tens of thousands of students participating in a single course–working at their own pace, relying on their own style of learning, and assessing each other's progress–has changed the landscape of online learning (p. 61).

Several universities established partnerships with MOOC providers to offer some of their courses online and at no cost. For example, Arizona State University (ASU), in partnership with edX, has begun to offer a list of free introductory general education

MOOCs (Ehrenberg, 2015); this initiative is called Arizona State Global Freshman Academy (GFA) and started to offer these MOOCs in fall 2015. Ehrenberg (2015) said that "individuals who have paid a $45 fee to verify their identities and successfully complete the class can opt to pay an additional $200 per credit if they wish to receive formal credit for it from ASU" (p. 14). The author explained that students who complete 24 credits of these general courses are granted admission to ASU as sophomores. They are admitted regardless of their test scores, high school grades, or any other variable (Ehrenberg, 2015).

Higher education generally focuses on finding ways to facilitate the spread of knowledge to more learners at lower costs (Daniel, J., Cano, E. V., & Cervera, M. G. (2015). Liyanagunawardena, Williams, and Adams (2013) also said that MOOCs could really contribute in fragile contexts, such as war, refugee camps, etc. For instance, a Syrian doctor, Mahmud Angrini, noted that he lost everything at the beginning of the civil war in Syria (Angrini, 2013). Meanwhile, he enrolled in MOOCs offered by Coursera and has received 25 statements of accomplishment and certificates. Angrini (2013) noted that these MOOCs not only helped him to improve his language skills, but also encouraged him to pursue a Ph.D. scholarship based on the new skills and advanced knowledge he recently gained (Angrini, 2013). He wrote

> Nowadays, I always tell my friends in refugee life: 'It is never too late to start again.' Someday, the war will end, and we will come back to our homes and our former lives to contribute to the reconstruction process in our country. To do so, we need to learn new skills, and this could only be achieved through continuing education. We can take advantage of the high quality courses that Coursera offers at no cost (Angrini, 2013, para. 4).

According to Klobas, Mackintosh, and Murphy (2015), MOOCs are more than open online courses that are available for large numbers of learners. The authors argue that MOOCs are coupled with the capacities and limitations of information technologies that make them available through platforms (Klobas, Mackintosh, & Murphy, 2015). Although MOOCs provide professional, life-long learners, and students opportunities to enhance their knowledge and acquire new skills at no cost, critics noted the need to investigate these new teaching approaches through a critical lens to confirm that they are effective (Johnson & Becker, 2015). Some of these concerns are related to online interaction, quality of the video lectures, offering MOOCs in international languages, and offering MOOCs to culturally diverse learners. These concerns will be discussed in the following sections.

Liyanagunawardena, Williams, and Adams (2013) noted that MOOC learners who come from developing countries live in different geographical locations, most of which have poor ICT infrastructure and slow Internet connections. Therefore, the authors argue that these learners might not be able to stay engaged with their MOOCs, especially the ones that have scheduled activities every day. Another concern the authors pointed out is the size of the video lectures. Liyanagunawardena, Williams, and Adams (2013) said that "while MOOC providers [make] a lot of effort to produce high definition videos to satisfy developed countries' participation with high expectations, these videos add to the challenges faced by developing countries' participants as the videos take either a long time or [fail] to download" (p. 4).

Language and culture are another two important issues discussed by Liyanagunawardena, Williams, and Adams (2013). The authors noted how language could be one of the issues that prevents learner in developing countries from benefiting from MOOCs. According to these authors "most developing countries have local

languages and only a small proportion of the population is competent in an international language, generally the language of the colonial occupiers" (p. 4). The majority of the MOOCs are currently offered in English, which limits access to most of the learners who are from developing countries (Liyanagunawardena, Williams, & Adams, 2013). Furthermore, the authors mentioned that MOOCs are offered globally to culturally diverse audiences and the possibility of conflict and misinterpretations are much higher than when offering a course in a class (Liyanagunawardena, Williams, & Adams, 2013). This is yet another challenge for MOOC educators and designers to overcome.

According to Daniel, Cano, and Cervera (2015), in most middle and low-income countries, MOOCs are not getting enough attention from educational policymakers. The authors argue that the MOOC movement has not really dealt with the real needs in the developing countries and there are several obstacles that MOOC providers and policymaker need to deal with in fragile contexts. For example, in many developing countries computer literacy is still low and these countries have inadequate ICT infrastructure to support the efficient use of MOOCs in any substantial way (Daniel, Cano, & Cervera, 2015).

Johnson and Becker (2015) mentioned that MOOCs gained a lot of attention in 2012, the same year the Federal Reserve Bank of New York released information that Americans owe more than $900 billion on student loans. Meanwhile, across the nation, forty percent of university students do not obtain a degree within six years. The authors said that MOOCs have prospered in an environment where an increasing number of students are concerned about what they are really gaining in exchange for the enormous costs of their education. However, a year after MOOCs garnered a considerable amount of attention, they became a subject of criticism as data about the results of the early MOOC offerings surfaced; several education experts and journalists questioned how

MOOCs' promise and reality are far away from each other (Johnson & Becker, 2015). Even Udacity's founder, Sebastian Thrun, was not satisfied with the MOOC initial findings. According to Kolowich, (2013), Thrun said "A medium where only self-motivated, Web-savvy people sign up, and the success rate is 10 percent, does [not] strike me quite yet as a solution to the problems of higher education" (para. 19). Several educators were concerned about certain aspects of MOOCs. For example, Guthrie (2013) mentioned that "the ongoing revelations about poor test results, high dropout rates [,] and disgruntled university instructors make it clear that MOOCs are not the panacea for 21st [century] higher education that their proponents claimed they would be" (para. 2). He also noted that "MOOCs have turned out to be only a minor achievement in pedagogy—and an expensive one at that" (2013, para. 3). On the other hand, other leaders consider the initial unsatisfactory outcome generated by MOOCs are expected and generally associated with higher education.

According to Daniel, Cano, and Cervera (2015), currently many MOOCs are not promoting adaptive and personalized learning. They are utilizing some classic distance learning models, since they are designed as a collection of videos with a chat forum. The authors argue that the main challenges for MOOCs in the coming years must be using adaptive and personalized learning along with the quality of the training process. These authors discussed the possibility of adaptive learning techniques making MOOCs more personalized. They said that even though this technique is underdeveloped, it is a possible solution and most likely will be available in the near future and argue that "Course designers … and policymakers of educational institutions might benefit from harnessing all the data MOOCs collect, and use them for improving educational activities, courses delivered, the learning experience as a whole" (Daniel, Cano, & Cervera, 2015, p. 68).

LEARNER READINESS FOR THE MOOC

The rapid and widespread diffusion of ICTs has brought new and varied approaches to education and increased the number of education providers who have global national and international impact. A great number of colleges and universities are developing and offering online courses and programs, providing additional educational opportunities (Lee, 2010). Consequently, the number of courses and programs available online has increased significantly. In the U.S., for example, Allen and Seaman (2014) noted that the number of students taking at least one online course has increased from 1.6 million students in fall 2002 to 7.1 million in fall 2012. This increase represents a compound growth rate of 16.1 percent per year; in the same period, the annual growth rate in higher education was only 2.5 percent as the number of students in higher education was 16.1 million in fall 2002 and became 21.3 million in fall 2012. Additionally, the number of offered MOOCs keeps increasing. For instance, in the U.S. only 2.6 percent of institutions offered a MOOC in 2012, but the number had almost doubled in 2013 to reach 5.0 percent and in 2014 had reached 8.0 percent (Allen & Seaman, 2013, 2014, 2015). In the Arab region also, several governments have rushed to create online learning projects and programs for different education levels (Mirza & Al-Abdulkareem, 2011). For example, in Saudi Arabia, a fully Arabic MOOC platform was launched in 2013 and is called *Rwaq*. This new educational initiative offers tuition-free, high quality academic courses taught by local professors and other professionals. *Rwaq* is in the process of becoming one of the regional hubs for online learning in the Middle East (Curley, 2013). An online survey that was conducted recently in the Arab region showed that respondents were positive about using different technologies and online resources in the classroom. About 67 percent of the participants said that if online learning resources were made available in their academic institution, they were willing to take advantage of

them. In terms of utilizing specific types of technologies in the classroom, the use of collaborative web tools such as Wikis and Google Docs, computers, laptops, and tablets were ranked the highest, while the use of SNS was ranked the lowest. Furthermore, the findings showed that students, teachers, and parents had similar responses regarding what students should be allowed to do in the classroom ("Transforming Education in the Arab World," 2013).

Dray et al., (2011) argue that with the continued growth in online learning, understanding learner readiness for online learning is essential. They noted that this can be achieved by understanding learner characteristics and ICTs engagement. According to the authors, learner characteristics refers to "individual beliefs in their ability to complete a college degree, beliefs about responsibility in problem solving (academic and technical), self-efficacy in writing and expression, orientation to time and time management, and behavior regulation for goal attainment" (p. 32). Additionally, Dray et al., (2011) noted that ICTs engagement refers to four main areas: basic technology skills (ability to use certain applications such as email, the Internet, documents and spreadsheet); access to technology (ownership of technology and access to the Internet); usage of technology (frequency and nature of use); and relationship with ICTs (values, beliefs, and confidence with technology). The ICTs engagement definition was drawn from the digital divide research frame by several researchers (e.g. DeTure, 2004; Hsieh, Rai, & Keil, 2008; van Dijk's, 2002, 2006; van Dijk & Hacker, 2003; Selwyn, 2004; 2011).

By integrating the second-level digital divide approach and resources and appropriation theory, this study explores questions on how the digital divide can predict learners' different levels of engagement with ICTs.

The Development of the Digital Divide Approach

The digital divide is a social problem that refers to a technology gap between minority and poor families who are less likely to have access to computers or the Internet than other families (Attewell, 2001). The digital divide recognizes inequalities in Internet access across several distinctions, including wealth, gender, ethnicity, and rural and urban differences. It also focuses on the exclusion of minorities, individuals with disabilities or lower education and income, or the elderly from Internet access (Hoffman & Novak, 1998; McConnaughey, Nila, & Sloan, 1995; Norris, 2001). In the mid-1990s, when the Internet emerged as a mass medium, several social scientists and policy makers have worried about the unequal dissemination of Internet access. At the beginning, researchers thought that inequality to Internet access can be achieved by reducing its cost (DiMaggio & Hargittai, 2001). However, many researchers observed also that individuals who had higher income and education and greater access to other resources used the Internet more than others, which might cause other manifestations of inequality (Anderson, Bikson, Law, & Mitchell, 2001; Goslee, & Conte, 1998; Hoffman & Novak, 1998, 1999; Norris, 2001; Strover 1999).

Since 2000, research on the digital divide gap has shifted from computer and Internet access gap to unequal digital skills and usage opportunities. As Internet access has become widespread, the focus of the digital divide shifted from inequalities between people with (haves) and without (have-nots) Internet access to digital skills and usage opportunities inequalities among individuals who are online (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Livingstone & Helsper, 2007; van Dijk, 2006). A more comprehensive approach, which is called second-level digital divide, has emerged to investigate and distinguish different levels of online skills among individuals. In this context, skill is defined as the capability to effectively and efficiently look up information

on the Internet (Hargittai, 2002). According to van Dijk (2002, 2006, 2013), since the year 2002, more researchers have suggested additional expressions such as "redefining the digital divide" and "beyond access." Van Dijk (2002, 2006, 2013) noted that others have added the concepts of digital skills, technology use and applications, or competencies and media, and he mentioned that empirical research of the digital divide distinguishes different kinds of access that is explained in the resources and appropriation theory.

The following section will discuss the resources and appropriation theory, which is a digital divide theory, and illustrate how it can shed light on factors that influence learners' engagement with ICTs.

Resources and Appropriation Theory

The resources and appropriation theory is a digital divide theory developed by van Dijk (2005, 2013) about the dissemination, acceptance and adoption of new technologies. Based on this theory, van Dijk (2013) argues that

> When sufficient motivation is developed one should be able to acquire physical access to a computer, the Internet or another digital medium. Additionally, one needs the material resources to keep using the technology that consists of peripheral equipment, software, ink, paper, subscriptions and so on. Having physical and material access does not automatically lead to appropriation of the technology as one first has to develop several skills to use the medium concerned. The more these skills are developed the more appropriate use can be made of the technology in several applications. The concept of usage can be measured, among others [,] by the observation of the frequency of usage and the number and diversity of application (p. 34).

Van Dijk (2005, 2013) noted that unequal distribution of resources is the result of categorical inequalities in the society and causes unequal access to digital technologies. This unequal access depends on the characteristics of these technologies and brings about unequal participation in society, which, in turn, increases categorical inequalities as well as unequal distributions of resources. The theory is based on four core concepts: (1) personal and positional categorical inequalities in society; (2) the dissemination of resources related to this type of inequality; (3) several kinds of access to ICTs; and (4) various fields of participation in society. The first two concepts are considered the causes of the digital divide and the last two could explain the consequences of the digital divide in society. For the purpose of this study, I will focus on the first three core concepts only.

Van Dijk (2005, 2013) demonstrated a number of personal and positional relational categories that create conditions of unequal access. Personal relational categories are related to individuals' physical or mental properties, such as gender (male/female), age (young/old), race (majority/minority), cleverness (cognitive/emotional/social), personality (extrovert/introvert; self-confident/not self-confident), and health (abled/disabled). Positional relational categories are related to specific positions in the division of labor (entrepreneur/worker; management/employee; employed/unemployed), in households (family/single person), in education (high/low), and inside or between countries (inside: city/rural area, citizen/migrant; between: developed/ developing). The author noted that inequalities that are based on these categories are considered fully social.

The second core concept is about the distribution of digital media related resources, which refers to: temporal (time to spend using digital media); material (income and possession); mental (motivation; technical ability); social (having a social network to

help in utilizing digital media); and cultural (status and interest to continue using digital media).

The third core concept concerns kinds of access to ICTs. The author noted that the empirical research of digital divide distinguishes four kinds of access: motivation (motivation to use digital technology); physical and material access (possession of or permission to use computers and Internet connections); digital skills (possession of operational, informational, and strategic digital skills); and usage (usage time; number and diversity of applications).

ICTs Adoption Across Countries

The dissemination of ICTs in any country depends greatly on several hard factors, such as economic development, technical infrastructure, and government performance. These hard factors also are good indicators of how many individuals can afford to own ICTs facilities in a country and to what extent ICTs is integrated in several sectors of the society in this country (Hermeking, 2006; Billon, Marco, & Lera-Lopez, 2009; Zhong, 2011). The more ICTs products become accessible and the amount of online information grows, the more opportunities people will have to utilize ICTs and will be required to use them skillfully (DiMaggio & Hargittai, 2001; Zhong, 2011). According to the Measuring the Information Society Report (MISR) of the International Telecommunication Union (ITU), although the information society is growing globally, in some segments the digital divide remains and is even widening. For instance, there is a significant urban-rural digital divide, where people in urban areas have affordable fast Internet access and essential digital skills to use online content effectively; the opposite is generally the situation in rural and remote areas of many developing countries (ITU, 2014).

In addition to the urban-rural divide, digital access divide still exists among developed and developing countries, different gender and generations, and different social groups. Several cross-cultural studies (e.g. Erumban & Jong, 2006; Jung, Kim, Lin, & Cheong, 2005) looked at ICTs adoption across countries and found that cultural settings of the economy and social environments, such as the possibility of getting internet-related support from others, influence the ICTs adoption decisions. Ono and Zavodny (2007) investigated patterns and determinants of ICTs usage in several countries: Sweden, the U.S., Japan, Singapore, and South Korea and found several commonalities and differences across these countries. Their study revealed that gaps in ICTs usage reflect pre-existing inequalities. For instance, the gender gap in ICTs usage in the U.S. and Sweden was lower than in the three Asian countries, which is a reflection of the smaller gender inequality in the first two countries. The findings indicate also that in a society with high degrees of gender inequality, gender is a strong determinant of ICTs usage. The authors draw the same conclusion concerning education and income.

LEARNER SATISFACTION WITH THE MOOC

Distance education refers to learning interventions where the instructor and learners who are geographically separated interact via interactive telecommunication (Moore, 1973; Simonson, Smaldino, Albright, & Zvacek, 2012). Distance education has several advantages over traditional courses, such as convenience and time flexibility (Buckley, 2003; Chen, Chang, Hung, & Lin, 2009; Washer, 2001). Nevertheless, it presents instructors and learners with different types of challenges than do college or face-to-face courses. Interaction between students and instructors is one of these challenges. In distance education, students might never get to a physical campus location

or establish relationships with their instructors and fellow students (Bolliger & Martindale, 2004). Arbaugh (2000) argues that learners' interactions with others in online courses increase their satisfaction with these courses. In fact, there are several studies on the correlation between learner satisfaction and interaction with others in online courses, but there is limited research that addresses this issue in MOOCs. Although MOOCs are considered a form of distance education (Romiszowski, 2013), they are different from online courses that universities have been offering for decades using several instructional technologies (Kim, 2013; "MOOCs - online education, 2012"). Several distance education theories can help us understand the learner experience in terms of interaction in and satisfaction with MOOCs. As mentioned previously, learner experiences emerge from the way learners interact with the content and instructors and the setting in which interaction and learning occur (Parrish, 2005). Therefore, the theory of independent learning and teaching and the "Three Types of Interaction" model (Moore, 1973, 1989) used in distance education can also be applied to analyze the learner experience with MOOCs.

The theory of independent learning and teaching and the "Three Types of Interaction" model introduced by Moore (1973, 1989) define interactions in distance education and identify three significant types of interaction. The following sections will discuss this theory and the three types of interactions.

Theory of independent learning and teaching

According to the theory of independent learning and teaching, distance teaching is an educational system where the learner and his teacher are separated from each other by space and time. Therefore, they communicate either by print, electronic, or some other

non-human medium. These independent learning and teaching educational systems consist of the following sub-systems: a learner, a teacher, as well as modes of communication. These three sub-systems have essential characteristics that differentiate them from learning, teaching, and communication in other education systems. For researchers to understand the independent learning system, they have to develop the concept of "autonomous learner." They should also consider the "distance teaching" concept to encompass the communication systems between the learner and his teacher in this independent learning and teaching environment (Moore, 1973, p. 633). Clear understanding of the nature of interaction in distance education and how to facilitate interaction through interactive telecommunication is essential (Moore & Kearsley, 2011). Moore identifies the following three significant types of interactions: learner-content interaction, learner-instructor interaction, and learner-learner interaction (1989).

Learner-Content Interaction

The instructor in distance learning should facilitate the interaction of students with the subject matter that is presented in the course. Learner's interaction with content is considered an essential characteristic of education. Interacting with content changes and improves the learner's understanding and ability, which is sometimes regarded as a change in perception or performance. So, the instructor's role in distance education is not only to assist each student as he/she interacts with the content, but also to convert the content into the user's personal knowledge (Moore, 1989). Halasek et al. (2014) argue that in MOOCs learners' interests and personal motivation in taking MOOCs determine whether and how they interact with the course materials. These two factors also determine the exact content that MOOC learners acquired from the class instruction and interaction. Consequently, this study proposes the following hypothesis:

H1: Learner satisfaction with learner-content interaction will positively influence learner satisfaction with the MOOC.

Learner-Instructor Interaction

Interaction between the learner and instructor is important for most learners and desired by most instructors. In general, instructors help students interact with the content presented in the course. Through interaction with learners, instructors can guide, support, and encourage them. Also, if self-directed learners interacted alone with the content presented in the course, they might be helpless at the point of application, if their knowledge of the subject matter is too limited (Moore, 1989). Ponti (2014) argues that even though increased access to open educational resources and digital media provides learners with more opportunities to increase their knowledge, learners still need assistance from instructors to comprehend different representations of concepts and conceptual understanding of a discipline. The President of the United States Distance Learning Association, Reggie Smith, says that based on his own experience, "The learner-instructor interaction is the most critical one to the success of the learning experience," for instructional and emotional reasons (as cited in Kolowich, 2010). Kauza (2014) said that the student-centered classrooms concept has its proponents; however, "there is a difference between student-centered and student-only classrooms, and MOOCs run the risk of being the latter" (p. 110). Accordingly, this work advances the following hypothesis:

H2: Learner satisfaction with learner-instructor interaction will positively influence learner satisfaction with the MOOC.

Learner-Learner Interaction

Interaction between the learner and other learners is another valuable type of interaction in distance education. It is very important because it helps learners to reflect on ideas, discuss them with each other, and test content that has been presented. This interaction could be an interaction within groups or a learner-to-learner interaction in a virtual group. This dimension of interaction has been enriched by utilizing social networking technologies in distance learning. These technologies facilitate learner collaboration in sharing points of view as well as experiences (Moore, 1989; Moore & Kearsley, 2011). Blau, Mor, & Neuthal (2013) found that in the online learning environment in a university course, learner-learner interaction such as sharing experiences and requesting feedback increases when learners ask explicitly for it and when they lack active facilitation by instructors. In the connectivist MOOC, for instance, it is expected that the learning happened not only as a result of the one-way transfer of content (from instructors to learners), but more essentially through networked and crowd-sourced collaborative interaction among learners (Porter, 2014; Ravenscroft, 2011; Siemens, 2005). Accordingly, the following hypothesis is posited:

> H3: Learner satisfaction with learner-learner interaction will positively influence learner satisfaction with the MOOC.

For users to utilize any new innovative technology, they will need to spend a lot of time and effort at the beginning to learn how to use it. Therefore, they must be willing to accept it before realizing its benefits. This example applies to new online educational innovation, such as MOOCs. The technology acceptance model (TAM) explains technology usage behavior and can help in predicting to what extent users might accept or refuse it (Davis, Bagozzi, & Warshaw, 1989; Reis, McGinty, & Jones, 2003).

Therefore, this theoretical framework is very appropriate for illuminating learners experience with a new innovation such as MOOCs and explain their acceptance of and satisfaction with MOOCs.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was introduced by Davis (1986) to predict and interpret individual acceptance or refusal of new computer-based technology. TAM was developed based on the theory of reasoned action and it suggests two specific beliefs that determine users' behavioral intention to use computer-based technology. These two beliefs are perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which a prospective user believes that utilizing a certain application system will improve her or his job performance. According to Davis (1989), perceived ease of use is the degree to which a prospective user assumes that he or she will not need to exert a lot of effort to use the target system. TAM predicts that individuals are willing to embrace technology when it is easy to use and when they see the benefits they will gain from utilizing it (Davis et al., 1989; Davis, 1989).

When applying the TAM to an online learning system, the prediction is that the more the learners perceive usefulness and ease of use, the more positive their attitudes are toward the system, which accordingly improves their learning experiences and satisfaction with it (Sun et al., 2008; Arbaugh, 2002; Arbaugh & Duray, 2002; Pituch & Lee, 2006). Therefore, by applying the TAM to MOOCs, the assumption is that it can predict learners' satisfaction with MOOCs and accordingly this study advances the following hypothesis:

H4: Learner perceived usefulness of the MOOC will be positively associated with learner satisfaction with the MOOC.

The Importance of Learner Satisfaction

The majority of college students expend considerable amounts of time, effort and money, which places a high value on their higher education experiences (Knox, Lindsay, & Kolb, 1993). However, it is also important for students not only to value these experiences, but also to be satisfied with them. According to Astin (1993), learner satisfaction refers to his/her perception of the college experience as well as the perceived value of the education received while enrolled in an educational institution. Satisfaction is a significant "intermediate outcome" (p.278) as it affects student's level of motivation (Donohue & Wong, 1997) and is a predictor of retention (Astin, 1993; Edwards & Waters, 1982). Bean and Bradley (1986) found that for college students, satisfaction had a greater impact on their performance than performance had on their satisfaction. Accordingly, the satisfaction of college students can be one of the main predictors of their academic success. Therefore, with the increase in number of MOOCs offered and enrolled learners, it has become important to examine the factors that influence learners' satisfaction with these online courses. As the literature shows, researchers have studied factors that influence learner satisfaction with online learning, but very limited research is available on learner satisfaction with MOOCs. Also, as mentioned earlier, although MOOCs are considered a form of distance education (Romiszowski, 2013), they are different from online courses that universities have been offering for decades (Kim, 2013; "MOOCs - online education, 2012").

The Effects of Learner Demographics

According to Moore and Kearsley (2011), distance education refers to teaching and planned learning when they occur in different places. This requires communication and interaction via technology and special institutional organization. Therefore introducing distance education into an institution requires making essential changes in the way teaching and other resources are used.

Several advantages of distance learning have made it a major topic in education. Among these are: increasing access to learning as a matter of equity; offering opportunities for enhancing skills; balancing inequality between different age groups; and providing a blending of work and family life with education (Moore & Kearsley, 2011; Simonson, Smaldino, Albright, & Zvacek, 2012). However, distance education also presents learners and instructors with several challenges related to digital literacy and interaction. Digital literacy is a legitimate problem for organizations offering distance education. Digital literacy refers to user ability to navigate through screens, operate controls, search for and find information, and create and process information in multimedia formats (Moore & Kearsley, 2011). Ledbetter and Finn (2013) found that online communication apprehension is correlated with reduced learner confidence in his/her ability to complete the required coursework and decreased sense of the value of the course. According to Ghobrial (2013), learners need to acquire some of these digital skills in order to benefit from online learning opportunities. So, while digitally literate learners may take MOOCs to enrich their knowledge and skills, learners who have little or no experience with information and communication technology skills are excluded from this opportunity. Interaction is another challenge distance education presents as learners might not get to a physical campus or establish relationships with their instructors and fellow learners (Bolliger & Martindale, 2004).

Holmberg (1985) argued that interactions between the instructors and learners are the core of teaching and Anderson (2003) suggested several forms of interaction that are important for formal learning. Also, Colorado and Eberle (2010) said that investigating learners' differences and the effect of these differences on learners' academic performance are essential for understanding the factors that promote success in online courses. Although, there are several studies investigating these issues in online learning, there is limited research addressing them in MOOCs. Several communication and distance education theories can help us understand the interaction between learners and instructors, other learners, and course content in MOOCs; they also show the effect of learners' demographics on their perception regarding the importance of these interactions and on learners' preferences in terms of being responsible for their own learning and accessing online learning resources after the course ends. The guided didactic conversation theory, interactive equivalency theorem, and andragogy theory, used in communication and distance education, are applied in this research to better analyze and understand the above-mentioned issues. The following sections will discuss these three theories.

Guided Didactic Conversation Theory

Holmberg's (1985; 1995) communication theory of guided didactic conversation argues that interaction between the instructors and learners is the core of teaching. Holmberg (1995) suggested that feelings of personal relation between instructors and learners increase study pleasure and motivation. These feelings are nurtured by two-way communication at a distance and well-developed self-instructional material. He also proposed that an actual exchange of arguments, questions, and answers via mediated

communication can improve teaching in distance learning. Holmberg noted that it is expected in pre-produced courses that virtual interaction via subject matter presentation can embrace part of the interaction by motivating students to think of various views, actions, and solutions, and interact with the course in general. Additionally, easy access to and interaction with the subject matter support learner motivation and accordingly facilitate learning from one-way traffic simulating interaction and from didactic communication in the form of two-way interaction between the instructors and learners (Holmberg, 1985; 1995). Distance teaching can support learner motivation and promote learning effectiveness and pleasure if it succeeds in doing the following: facilitate access to course content; provide to and from the learner useful real and simulated communication; engage the learner in discussions, activities and decisions; and make the study relevant to learner needs (Holmberg,1996).

In addition to Holmberg's theory, Anderson's (2003a) theory recommends the availability of at least one of three forms of interaction at a high level in formal learning, which will be discussed in the following sections.

Interactive Equivalency Theorem

According to Anderson (2003a), interaction with an instructor is usually an essential component of a formal learning experience. The interaction concept traditionally focused on classroom-based dialogue between teaching and learning parties, but it has been extended to include mediated synchronous and asynchronous dialogue at a distance, as well as feedback and responses from inanimate objects such as "interactive computer programs" (Anderson, 2003b).

Moore's (1989) "Three Types of Interaction" model identifies three significant modes of interaction in distance education and Anderson's (2003a) interactive equivalency theorem recommends the availability of at least one of the three modes at a high level. The interactive equivalency theorem suggests that the following forms of interaction are important for formal learning: student-teacher, student-student, and student-content. In fact, education has always valued interaction and deep and significant formal learning is considered supported if one of these forms of interaction is at a high level (Anderson, 2003a). Offering the other two forms of interaction at minimal levels or even eliminating them does not degrade the educational experience. Offering high levels of more than one of these forms of interaction most likely will provide a deeper satisfaction with the educational experience (Anderson, 2003a). However, "these experiences may not be as cost or time effective as less interactive learning sequences." (Anderson, 2003a, p. 4). This theorem suggests that instructional designers have the option of substituting one of these three types of interaction for one of the others with minimal loss in educational effectiveness. Differentiating between low and high levels of interaction can be based on a descriptive quantitative scale in which participants count the number of times they are engaged with the other participants or content (Anderson, 2003a).

Although student-teacher interaction is important for most learners (Anderson, 2003a; Moore, 1989), some students purposely choose learning programs that require a minimum amount of student-teacher interaction (May, 1993; Kramarae, 2003). This is just one example of how different learners might consider one mode of interaction more important for them than the other modes. These different approaches can be due to differences in learners' characteristics. For instance, Dillon and Greene (2003) argue that self-regulated learners exercise greater autonomy than dependent learners in their

learning decisions. Identifying these differences is important for educators and educational institutions which are designing and offering MOOCs in order to customize interaction in their MOOCs based on what their learners consider important.

Andragogy Theory

The link between learners' characteristics and the modes of interaction they consider important can be explained by Knowles's (1980) andragogy theory. Moore and Kearsley (2011) argue that understanding the nature of adult learning is an important factor in understanding distance learners; they consider Malcom Knowles' (1980) andragogy theory the best known description of adult learning. It is an adult education theory premised on several assumptions regarding the characteristics of learners, learning, and teaching. Two of these assumptions are the self-concepts of learners and learning as an internal process. According to these assumptions, people start to see themselves increasingly as doers or producers, more than as full-time learners when they define themselves as adults. They move from being dependent toward being self-directed learners who can be responsible for their own learning. Thus, Knowles (1980) suggests that the instructor role in adult education is to engage with the learners in a process of mutual inquiry rather than to transmit knowledge to them. He also argues that learning is an internal process and individuals are motivated to engage in learning either when they feel a need to learn or have goals that learning will help them achieve. They will make use of the available resources, such as teachers and reading, as long as these resources are relevant to their goals or needs. Therefore, the interaction between individuals and their environment is the central dynamic of the learning process and the quality of this interaction influences the quality and amount of learning. It is essential for instructors in

adult learning to manage effectively these two key variables, interaction and environment. In other words, instructors should provide learners with a rich environment where they can extract learning and guide their interaction with it to maximize their learning from it (Knowles, 1980). In addition to these two assumptions, learner demographics are important factors that can also affect learner choices in online education.

Previous studies have revealed that age and highest level of education are among the factors that affect learners' approaches in online learning. Woodley and Parlett (1983), for example, found that age and level of education were related to persistence for learners enrolled at Britain's Open University. Also a recent study conducted by Islam, Rahim, Tan, and Momtaz, (2011) confirmed that age and level of education have significant influence on the effectiveness of e-learning. Younger learners tend to be more competent computer users and spend more time using the Internet than older learners (Yu, Kim, & Rho, 2001). According to Okiki and Asiru (2011), age is a variable that correlates with computers and use of electronic resources. For example, Sanchez-Gordon and Luján-Mora (2013) conducted a preliminary study to illustrate the web accessibility challenges of MOOCs for elderly learners and noted that the MOOC platforms and courses they analyzed have web accessibility issues that should be addressed. Kember (1995) also argues that past educational attainments is the most widely used variable in predicting learner success in educational courses; Chmielewski (1998) found that education is a significant factor in use of the Internet as learners with more education used the Internet more often.

With the growing interest in creating MOOCs and the increasing number of enrolled learners, it has become essential to investigate how learner demographics such as age and education affect a learner's approach in taking MOOCs. For example, how the

importance of interacting with teaching staff, course content, or feeling supported by other learners can vary among learners of different age groups or levels of education. As the literature illustrates, researchers have examined how learner demographics can influence learner approach toward online learning, but very limited studies are available on how learner demographics affect one's approach in taking MOOCs. Even though MOOCs are presented as a form of distance education (Romiszowski, 2013), they are different from universities' online courses that have been offered for decades (Kim, 2013; "MOOCs - online education, 2012").

Chapter 3: Methodology

This study examines similarities and differences among MOOC learners concerning their readiness for online learning and levels of engagement with ICTs, self-efficacy, and locus of control. These learners live in different countries that have varied ICT Development Index (IDI) ranks and economic classifications. Additionally, it investigates MOOC learners' online interaction and satisfaction with certain MOOC features. The study looks at the effects of MOOC learner demographics, such as age and level of education, on their perception regarding the importance of factors related to online interaction and MOOC content.

This chapter explains in detail the process of conducting this study and includes the operational and conceptual definitions of several variables utilized in this research. This chapter includes research design, data sources, collection process, and demographics of the participants.

This study relied on a convenience sample of learners who took MOOCs offered through two MOOC providers based in the U.S. and Saudi Arabia. Therefore, the results cannot be generalized to all MOOC learners. It is not certain whether measuring other MOOC learner populations in other venues or other historical times would generate similar or divergent results. Hence, more research should be conducted among learners who are taking MOOCs offered by other instructors or through other providers in different regions.

This research is based on data collected from learners who enrolled in MOOCs offered in English and Arabic. The English MOOCs are offered by The University of Texas at Austin (UT) through the MOOC provider edX, which is based in the U.S. The Arabic MOOCs are offered by Arab professors and professionals through the MOOC

provider Rwaq, which is based in Saudi Arabia (see Table 1 and Table 6). Both the English and Arabic MOOCs were open for any learner to enroll in without any charges or any restrictions, and at any time during the course duration. The MOOCs covered different subject matters and many of them were introductory-level courses. This study relies on a comparative case study design to identify, analyze, and explain similarities and differences across learners from different nations, cultures, or aspects of background.

CONDUCTING TWO TYPES OF SURVEYS

Two different types of surveys were conducted, an online learning readiness survey (OLRS) (see Appendix A) and an online interaction and satisfaction survey (OISS) (see Appendix D); two datasets were created from the surveys' responses. The first survey examined MOOC learner readiness for online learning and was sent to each learner who was enrolled in any one of the following five MOOCs: Linear Algebra - Foundations to Frontiers (LAFF), the Basics of Photography, Palestinian Refugee Studies, Documentary Filmmaking and Directing, or Online Assessment (see Table 1). The first dataset consists of the survey responses I received from these five MOOCs.

The second survey explored factors that influence learner experience and satisfaction with the MOOC and was sent to each learner who was enrolled in any one of the following four MOOCs: Arts and Culture, Energy and Earth Sciences, Business and Management, or Health and Safety (see Table 6). The second dataset consists of the survey responses I received from these four MOOCs.

The surveys were administered only online using Qualtrics, an online survey software. To invite learners to participate in each survey, an email announcement was sent to all enrolled learners with the survey link. Each learner who was enrolled in any

one of the nine above-mentioned MOOCs was invited to participate regardless of whether they were enrolled at the beginning of the MOOC or during it and whether or not they were active in the course.

The OLRS and OISS surveys were designed in English; then the OLS survey was translated into Arabic by two native Arabic speakers. Before conducting the surveys, both the English and Arabic surveys were submitted and approved by the Institutional Review Board (IRB) at UT. The IRB study numbers of these surveys are [2013-11-0072] and [2014-08-0028].

Conducting the Online Learning Readiness Survey (OLRS)

As shown in Table 1, the English version of the OLRS was sent to learners who were taking UT MOOCs offered through edX in spring 2014 and the Arabic version was sent to learners who were taking MOOCs offered in Arabic through Rwaq in fall 2014. The total number of enrolled learners in this UT MOOC was 28,338, but the number of learners who did not dropout of the MOOC and remained active until the end was much less than the initial number, especially because the MOOC was a tuition-free course. For example, the number of learners who received certificates of achievement was about 1,225, which represents around 4% of learners who enrolled in this MOOC. This retention rate falls within the ranges to which other researchers have referred. Reich (2014) mentioned that the typical MOOC retention rate ranges from 2 to 10 percent and according to Koller, Ng, Do and Chen (2013), it is about 5%. However, in this research in order to give each learner an equal opportunity to participate in the survey, an email announcement with the survey link was sent to the 28.338 learners. The total number of the survey participants was 2,450; however, 361 of these cases were deleted due to

invalid data; to fulfill the IRB requirements, responses of learners who were less than 18 years old by the time the survey was conducted, were deleted from the dataset (47 cases); responses that did not include answers for the OLRS questions were deleted (295 cases); responses that included a few answers and for the demographic questions only, without answering the reset of the survey questions, were deleted as well (19 cases). It is also worth mentioning that in order to protect participants' anonymity, survey responses were not linked to participants' records in terms of whether they received the certificates of achievement or not.

For the Arabic version of the OLRS, an email announcement with the Arabic survey link was sent to all learners enrolled in any of the four MOOCs offered in Arabic through Rwaq. The total number of enrolled learners in the four Rwaq MOOCs was 18,395. However, the total number of learners who received certificates of achievement was 2,504 and learners who participated in the Arabic OLRS was 970. As illustrated in Table 1, the response rate of the survey varied from 19% to 72% and was calculated by dividing the number of learners who filled out the survey by the number of learners receiving the certificates of achievement. The lowest response rate (19.5%) was close to the typical response rate (19.8%) for web-only surveys without response incentive (Sax, Gilmartin, and Bryant 2003), which was the case in this study as participants were not offered any incentives. Recent studies that surveyed MOOC learners online reported low response rates. For example, Christensen et al. (2013) and Liu et al. (2014) reported response rates of 8.5% and 8% respectively. Among these 970 surveys' responses, 177 cases were deleted due to invalid data. Responses of learners who reported an age of less than 18 years by the time the survey was conducted were deleted from the dataset (28 cases); responses that did not include answers for the OLRS questions were deleted (149 cases).

Table 1: Description of Five of the Nine Surveyed MOOCs

No.	Course Subject	Semester	Year	Survey Language	MOOC Provider	No. of Enrolled Learners	Survey Topic	No. of Learners Completed the MOOC/ Certificates Issued	No. of Survey Participants	Response Rate
1	The Basics of Photography	Fall	2014	Arabic	Rwaq	7,054	OLRS	1591	310	19.5%
2	Palestinian Refugee Studies	Fall	2014	Arabic	Rwaq	2,844	OLRS	138	78	56.5%
3	Documentary Filmmaking and Directing	Fall	2014	Arabic	Rwaq	4,749	OLRS	295	212	71.9%
4	Online Assessment	Fall	2014	Arabic	Rwaq	3,748	OLRS	480	148	30.8%
5	Linear Algebra - Foundations to Frontiers (LAFF)	Spring	2014	English	edX	28,338	OLRS	1,225	*2,450	8.6%

**Note*: As the number of learners in this MOOC who filled out the survey surpasses the number of learners who received the certificates of achievement, only in this MOOC the response rate was calculated by dividing the number of learners who filled out the survey by the number of enrolled learners; instead of the number of learners receiving certificates of achievement.

Profile of Learners

Data provided in Table 2 show information about the demographics of 2,496 learners who participated in the English and Arabic OLRSs.

Profile of the English Survey Learners

For participants who took the English OLR survey (edX learners), nearly 41% of them live in the United States (see Table 3 and Appendix C), followed by learners who live in India (8.7%), Brazil (3.7%), United Kingdom (3.3), and Canada (2.7). As illustrated in Table 2, the majority of the subjects were full-time working professionals (45.4%), followed by college or university students (16.3%) and non-working participants (13.3%).

Profile of the Arabic Survey Learners

With regard to participants who took the Arabic OLRS (Rwaq learners), as indicated in Table 3, nearly 51% of the participants live either in Saudi Arabia or Egypt, followed by learners from Syria (10.6%), Morocco (6.4%), Yemen (6.3%), and Algeria (5.1%). About 35% of the subjects were full-time working professionals (see Table 2), followed by college or university students (25.1%) and non-working participants (13.9%).

Table 2: Learner Demographics of the Online Learning Readiness Surveys

Measures and items	English Survey (edX)		Arabic Survey (Rwaq)	
	Frequency	Percentage	Frequency	Percentage
Age				
Under 25	413	19.8	263	38.6
25-35	697	33.4	298	43.8
36-49	498	23.8	105	15.4
50 or older	481	23.0	15	2.2
Gender				
Male	1774	85.2	407	59.6
Female	308	14.8	276	40.4
Highest level of education				
Middle/High school	237	11.4	106	15.5
Some College	242	11.6		
Two-Year College/Higher Technical Education	107	5.1	142	20.8
Bachelor's degree	688	33.0	311	45.5
Professional/Master's/doctoral degree	809	38.8	124	18.2
Primary occupation				
Non-working	278	13.3	97	14.1
High school student	43	2.1	12	1.7
College/university student	341	16.3	175	25.4
Graduate student	174	8.3	38	5.5
Part-time working professional	96	4.6	35	5.1
Full-time working professional	949	45.4	237	34.4
Self-employed/consultant	202	9.7	88	12.8
Other	6	0.3	6	0.9

Table 3: List of the Participants' Countries

English Survey (edX)			IDI R	IDI V	Reg	CC	Arabic Survey (Rwaq)			IDI R	IDI V	Reg	CC
Country	Freq.	%					Country	Freq.	%				
United States	850	40.8	15	8.19	N.Am.	DE1	Saudi Arabia	183	27.0	41	7.05	AS	DE2
India	181	8.7	131	2.69	AsPac	DE2	Egypt	161	23.7	100	4.40	AS	DE2
Brazil	77	3.7	61	6.03	LAC	DE2	Syria	73	10.8	117	3.48	AS	DE2
United Kingdom	69	3.3	4	8.75	EU	DE1	Morocco	42	6.2	99	4.47	AS	DE2
Canada	56	2.7	23	7.76	N.Am.	DE1	Yemen	42	6.2			AS	DE2
Spain	52	2.5	26	7.66	EU	DE1	Algeria	33	4.9	113	3.71	AS	DE2
Australia	46	2.2	13	8.29	AsPac	DE1	Jordan	32	4.7	92	4.75	AS	DE2
Mexico	46	2.2	95	4.68	LAC	DE2	Sudan	21	3.1	126	2.93	AS	DE2
Germany	41	2.0	14	8.22	EU	DE1	Israel	13	1.9	35	7.19	EU	DE2
China	40	1.9	82	5.05	AsPac	DE2	Oman	9	1.3	54	6.33	AS	DE2
Russian Federation	37	1.8	45	6.91	CIS	ET	Lebanon	7	1.0	56	6.29	AS	DE2
Netherlands	32	1.5	8	8.53	EU	DE1	Libya	7	1.0			AS	DE2
Colombia	25	1.2	75	5.32	LAC	DE2	United Arab Emirates	7	1.0	32	7.32	AS	DE2

Notes. Abbreviations used in this table: Frequency = Freq., Percentage = %, IDI Rank = IDI R, IDI Value = IDI V, Region = Reg, Country Classification = CC, Developed economies = DE1, Developing economies = DE2, Economies in transition = ET, Arab States = AS, Asia and the Pacific = AsPac, Commonwealth of Independent States = CIS, Europe = EU, Latin America and the Caribbean = LAC, and North America = N.Am. This table has only the list of countries where several MOOC learners live, but this list is not inclusive. Appendix C has the inclusive list of the countries where MOOC learners who participated in this study live.

Measures of Key Variables in the OLRS

The online learning readiness (OLR) variable is one of the variables examined in the online learning readiness survey (OLRS). To answer the proposed research questions, several groups of variables (dependent, independent and control) were examined in relation to the online learning readiness (OLR) variable.

Dependent Variables

Four variables (ICTs engagement, self-efficacy, locus of control, and OLR) were tested as dependent variables; three of them were subscales of the OLR scale and the fourth variable was the one that comprised the 22 items of the OLRS. The questionnaire items of the OLRS were adopted from a survey instrument developed by Dray et al. (2011) to assess student readiness for online learning. After getting permission from the survey instrument authors to use it and revise their questions, I made minor changes to some of the questionnaire items to ask particularly about MOOCs, instead of online courses in general. According to Dray et al. (2011), the current survey has an ICTs engagement subscale and a learner characteristics scale that includes two subscales: self-efficacy and locus of control (see Appendix B).[1] Each of the questionnaire items was measured on a four-point Likert-type scale. The values of the scale ranged from 1 = strongly disagree to 4 = strongly agree.

The following paragraphs demonstrate the process of aggregating questionnaire items into variables to construct each of the abovementioned four variables. This process involved employing two types of analysis to identify and validate the factors underlying

[1] I received the final version of the OLRS from B. J. Dray and M.J. Miszkiewicz through personal communication on January 6, 2014. Along with the OLRS, I received the questionnaire items and Cronbach's alpha value for each of the subscales, ICTs engagement, self-efficacy, and locus of control.

the four dependent variables. These two kinds of analysis were exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). According to (Muthén & Muthén, 2015), EFA is utilized to assess the number of needed continuous latent variables that describe the correlations between a set of observed variables and CFA is conducted to examine the relationships between a set of continuous latent variables and a set of observed variables. Therefore, EFA was employed first to explore and eliminate questionnaire items with low factor loadings and communalities; then, CFA was conducted to reduce and validate the factors underlying each of the four dependent variables. Two statistics programs were used: the Statistical Package for Social Sciences (SPSS) to conduct the EFA and the Analysis of Moment Structures (AMOS) to conduct the CFA. For the EFA, a correlation matrix of association was examined by the principal component analysis (PCA) extraction method with Varimax rotation in SPSS.

Additionally, in this study, several indices of model-fit evaluation were utilized, such as the normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). A good model fit would be demonstrated by values greater than .90 for NFI and CFI (Bentler and Bonett, 1980; Hu and Bentler, 1999); for RMSEA, values less than 0.05 indicate good model fit and values ranging from 0.05 to 0.08 indicate reasonable model fit (Kenny, 2015; MacCallum, Browne, & Sugawara, 1996).

ICTs Engagement. This variable is one of the OLR subscales and consists of nine questionnaire items (see Appendix B). Four of these items were negatively phrased (ICTs_4, ICTs_5, ICTs_7, and ICTs_8) and the responses were reverse coded in the analysis. The ICTs engagement variable measures four areas related to levels of engagement with ICTs: (a) basic ICTs skills that include the capability of utilizing certain applications in certain ways, such as Internet, email, documents, and spreadsheet; (b)

access to ICTs, including possession of technology and Internet connections; (c) usage of ICTs including the nature and regularity of use; and (d) relationship to ICTs including beliefs, comfort, and confidence with ICTs (Dray et al., 2011).

The nine ICTs engagement items were analyzed using EFA and accordingly two of the nine items were eliminated (ICTs_3 and ICTs_9). When the remaining seven items were included in CFA of the ICTs engagements variable, the model fit was not good. Accordingly, two problematic items (ICTs_2 and ICTs_8) were deleted and a correlation between the error terms of ICTs_1 and ICTs_6 (see Figure 1) was included, which indicates a synchronous correlation between these two variables without causal effects. Consequently, the final model indicates a good fit of data, CFI = 0.99, NFI = 0.99, and RMSEA = 0.02.

B. J. Dray and M.J. Miszkiewicz (personal communication, January 6, 2014) noted that the ICT engagement subscale, which is used in this study, has a Cronbach's alpha = .77 and contains nine items (see Appendix B); however, based on the factor analysis in this study, five items comprise the ICTs engagement variable (M = 3.22; SD = 0.62) and it has a Cronbach's alpha = .75. These items are the following: When I have to look up information on the Internet for any reason, I am comfortable with the task; when asked to download and install new software on my computer, I feel anxious about my ability to complete the task; when asked to download audio or video from email and view or listen to it on my computer (e.g. files sent from someone else), I feel anxious about my ability to complete the task; when asked to find and view video on the Internet (e.g., YouTube, MSNC, CNN, The Economist, etc.), I feel confident that I can find and view the video; and when asked to find and listen to audio on the Internet (e.g., live radio broadcasts or music stations, or archived music or podcasts), I feel anxious about my ability to complete the task.

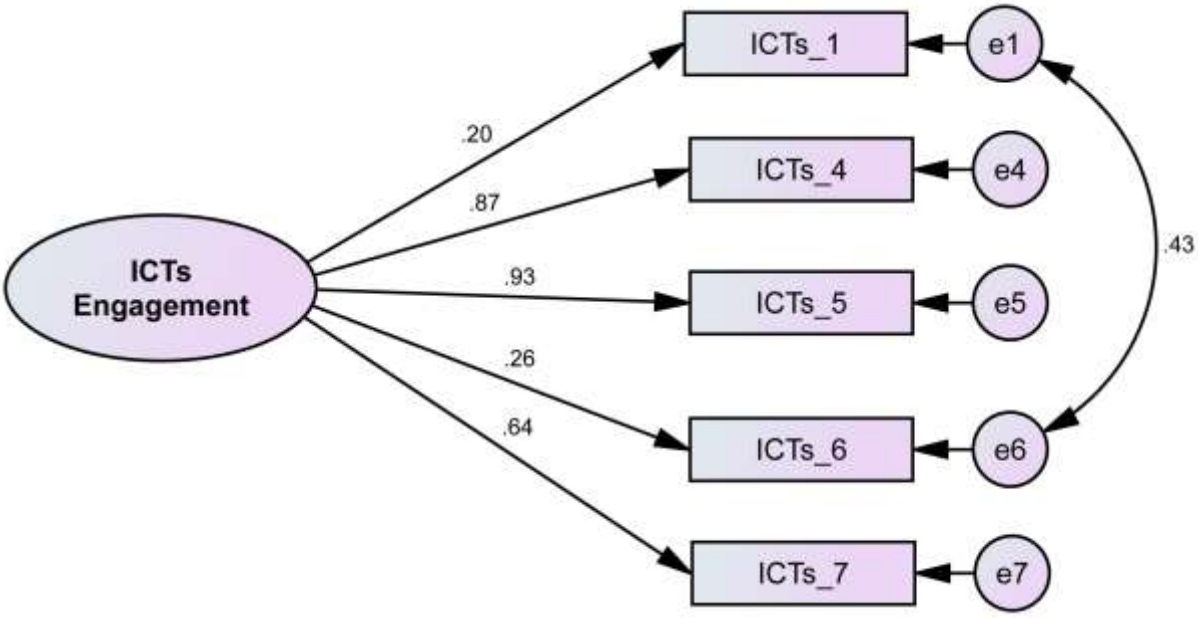

Figure 1: Confirmatory Factor Analysis Model of the ICTs Engagement Variable (Standardized Regression Coefficients).

Notes. Model fit statistics: CFI = 0.99, NFI = 0.99, and RMSEA = 0.02. In this model, five out of the nine items were retained with standardized factor loadings ranged from 0.20 to 0.93 and correlation between residual error variances e1 and e6 = 0.43.

Self-Efficacy. This is another OLRS subscale and consists of six questionnaire items (see Appendix B). It measures learner characteristics in terms of their beliefs to be responsible for problem solving and completing tasks independently, self-efficacy in writing and communication, and interactive social skills (Dabbagh, 2007).

The six self-efficacy items were factor analyzed using EFA and consequently one of the items was eliminated (SE_4), before conducting a CFA. The remaining five items were included in CFA of the self-efficacy variable and a correlation between the error terms of SE_1 and SE_2 and the error terms of SE_5 and SE_6 (see Figure 2) were included, which indicates a synchronous correlation between each of the two variables

without causal effects. The final model indicates a good fit of data, CFI = 0.99, NFI = 0.99, and RMSEA = 0.02.

B. J. Dray and M.J. Miszkiewicz (personal communication, January 6, 2014) indicated that the self-efficacy subscale, used in this study, has a Cronbach's alpha = .77 and contains six items (see Appendix B); however, based on the factor analysis in this study, five items comprise the self-efficacy variable (M = 3.16; SD = 0.50) and it has a Cronbach's alpha = .81. These items are the following: I am comfortable expressing my opinion in writing to others; I am able to express my opinion in writing so that others understand what I mean; I work well in a group. (For example, I am an active communicator in a group, I contribute my fair share in a group, etc.); I am comfortable responding to other people's ideas; and I give constructive and proactive feedback to others even when I disagree.

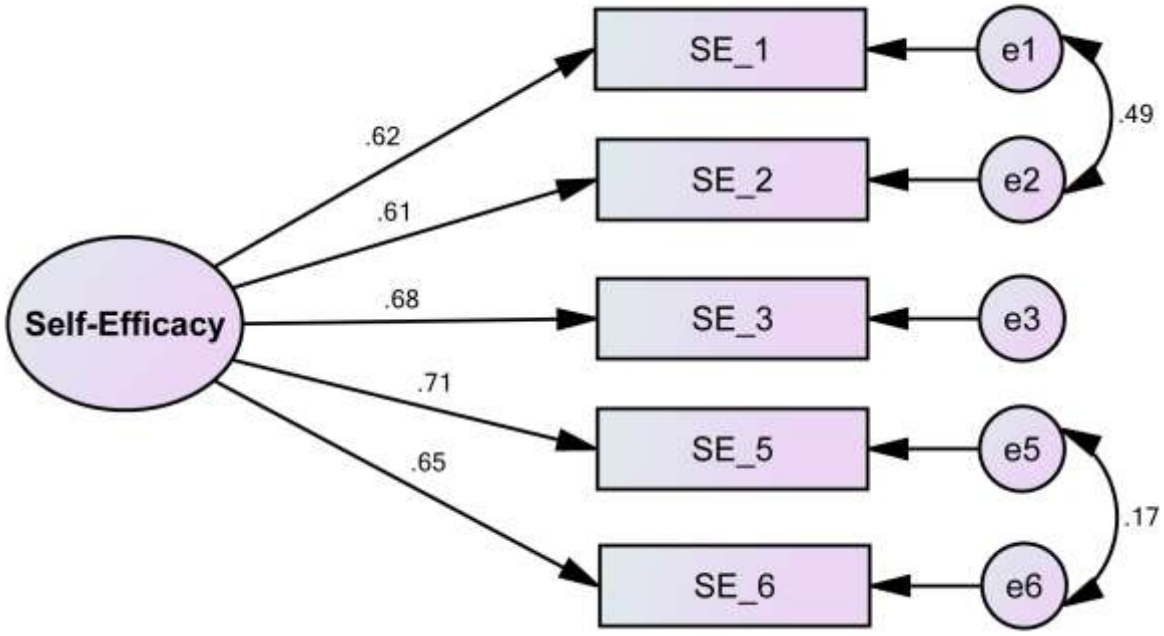

Figure 2: Confirmatory Factor Analysis Model of the Self-Efficacy Variable (Standardized Regression Coefficients).

Notes. Model fit statistics: CFI = 0.99, NFI = 0.99, and RMSEA = 0.02. In this model, five out of the six items were retained with standardized factor loadings ranged from 0.61 to 0.71 and correlations between residual error variances e1 and e2 = 0.49 and between e5 and e6 = 0.17.

Locus of Control. This variable is an OLR subscale and consists of four questionnaire items. It measures learner characteristics with regard to their time orientation and management, behavior control for goal achievement, and understanding the main ideas with guidance from the instructor.

The four locus of control items were factor analyzed using EFA and none of the four items was eliminated. The four items were included in CFA of the locus of control variable and a correlation between the error terms of LC_3 and LC_4 (see Figure 3) was included, which indicates a synchronous correlation between these two variables without

causal effects. The final model indicates a reasonable fit of data, CFI = 0.99, NFI = 0.99, and RMSEA = 0.07.

B. J. Dray and M.J. Miszkiewicz (personal communication, January 6, 2014) noted that the locus of control subscale, used in this study, has a Cronbach's alpha = .70 and contains four items; based on the factor analysis in this study, the same items comprise the self-efficacy variable (M = 3.07; SD = 0.49) and it has a Cronbach's alpha = .71. These items are the following: I organize my time to complete course requirements in a timely manner; I regulate and adjust my behavior to complete course requirements; I understand the main ideas and important issues of readings without guidance from the instructor. (For example, I can read for comprehension without guided questions from the instructor); and I achieve goals I set for myself.

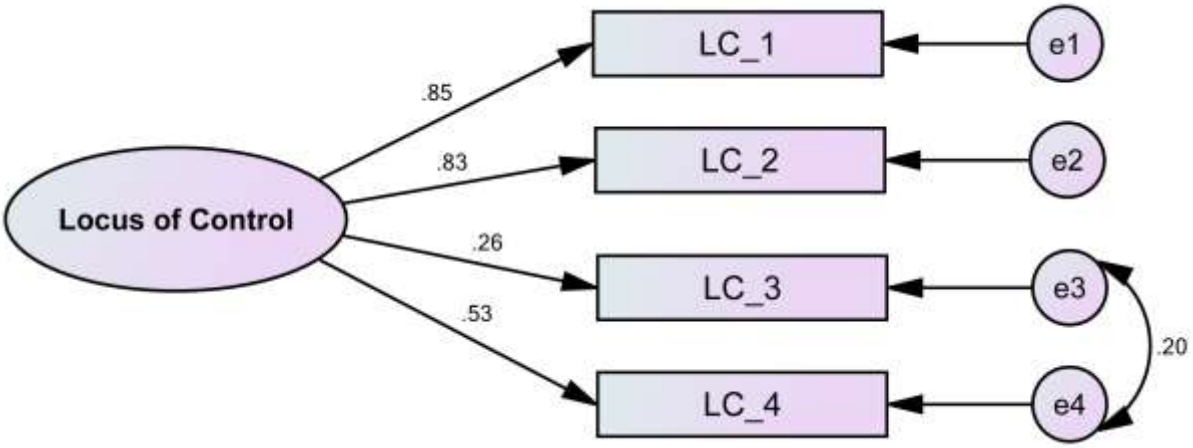

Figure 3: Confirmatory Factor Analysis Model of the Locus of Control Variable (Standardized Regression Coefficients).

Notes. Model fit statistics: CFI = 0.99, NFI = 0.99, and RMSEA = 0.07. In this model, the four items retained with standardized factor loadings ranged from 0.26 to 0.85 and correlations between residual error variances e3 and e4 = 0.20.

Online Learning Readiness. This variable consists of the 21 questionnaire items (see Appendix B) that assess learner readiness for online learning through measuring all together, the three above-mentioned variables (ICTs engagement, self-efficacy, and locus of control) and learner confidence in their ability to excel in an online program and be responsible for their own education.

The twenty-one OLR items were factor analyzed using EFA and consequently two items were eliminated (OLR_3 and OLR_10), before conducting a CFA. When the remaining 19 items were included in CFA of the OLR variable, the model fit was not good. Accordingly, eight problematic items (OLR_4, OLR_5, OLR_6, OLR_7, OLR_12, OLR_15, OLR_16, and OLR_19) were deleted and correlations between the error terms of OLR_1 and OLR_2, OLR_1 and OLR_8, and OLR_11 and OLR_14 (see Figure 4)

were included, which indicate synchronous correlations between these variables without causal effects. Consequently, the final model indicates a reasonable fit of data, CFI = 0.94, NFI = 0.94, and RMSEA = 0.06.

B. J. Dray and M.J. Miszkiewicz (personal communication, January 6, 2014) indicated that the OLR instrument, used in this study, consists of 21 questionnaire items; however, based on the factor analysis in this study, eleven items comprise the OLR variable (M = 3.35; SD = 0.38) and it has a Cronbach's alpha = .83. These items are the following: When I have to look up information on the Internet for any reason, I am comfortable with the task; When reviewing information on the Web, I am confident that I am aware of author bias and point of view; When asked to find and read articles or newspapers on the Internet, I feel comfortable in my ability to successfully complete the task; I believe that I will continue to have daily access to a computer, the Internet and the software required in order to complete assignments[2] for as long as needed to complete this MOOC; I am able to express my opinion in writing so that others understand what I mean; I am good at completing tasks independently; I am comfortable responding to other people's ideas; I regulate and adjust my behavior to complete course requirements; I understand the main ideas and important issues of readings without guidance from the instructor. (For example, I can read for comprehension without guided questions from the instructor); I am confident in my ability to excel in an online program; and I believe I am responsible for my own education; what I learn is ultimately my responsibility. For example, I am responsible for communicating with my professor, when I have difficulty understanding, obtaining answers to questions I might have about assignments, material, and content, etc.

[2] The word "assignment," without the plural "s," was a typographical error in the original OLRS.

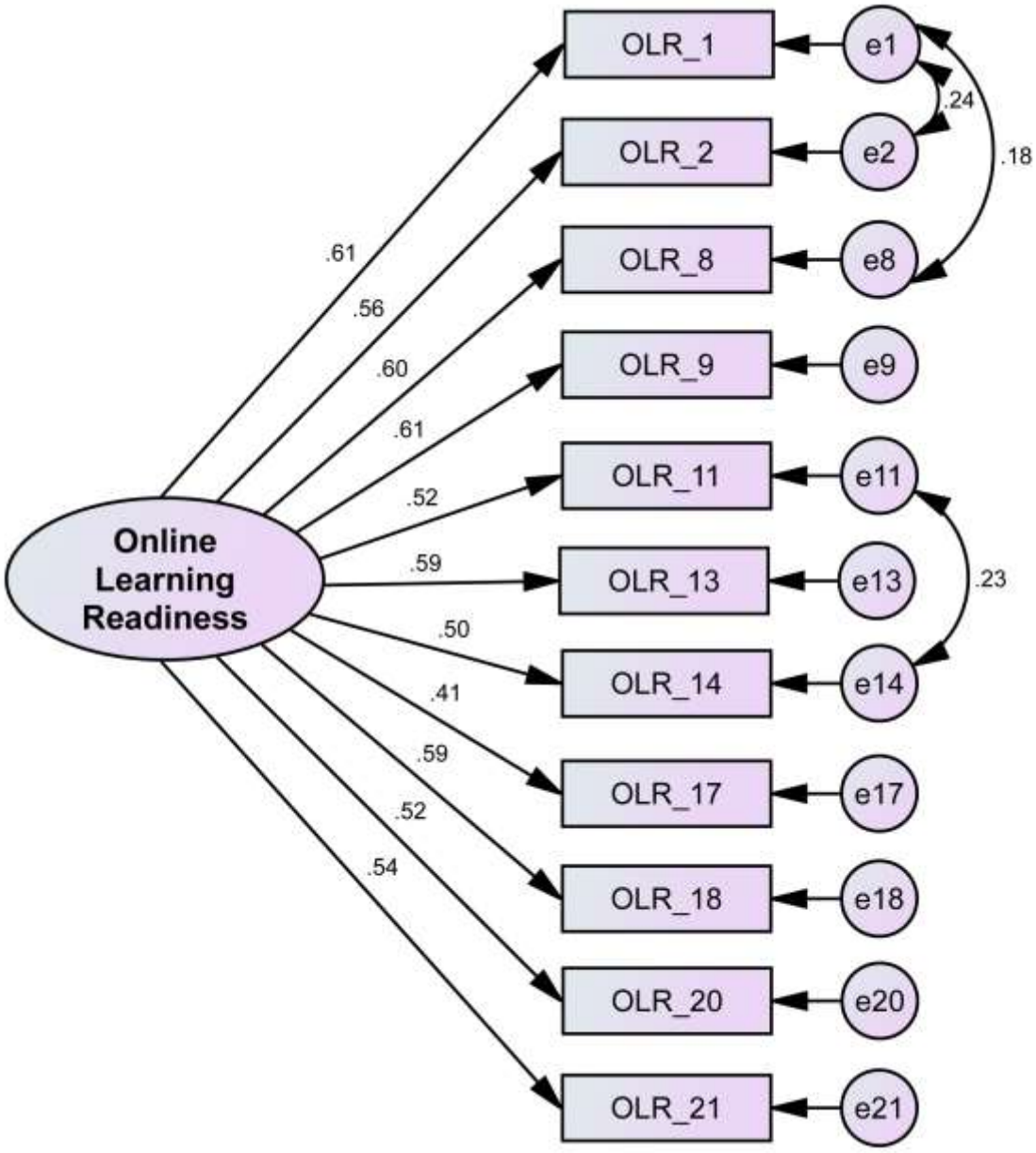

Figure 4: Confirmatory Factor Analysis Model of the OLR Variable (Standardized Regression Coefficients).

Notes. Model fit statistics: CFI = 0.94, NFI = 0.94, and RMSEA = 0.06. In this model, eleven out of the twenty one items were retained with standardized factor loadings ranged from 0.41 to 0.61 and correlations between residual error variances e1 and e2 = 0.24, e1 and e8 = 0.18, and e11 and e14 = 0.23.

Independent Variables

Gender. Van Deursen, van Dijk, and Peters (2011) noted that gender is one of the user demographics that is commonly discussed in digital divide research, mostly about Internet access or Internet use. Although the percentage of men and women online in the U.S. is nearly equal, men are a little more involved in using the Internet (Fallows, 2005). Therefore, this study will examine whether gender affects MOOC learner readiness for online learning. Respondents were asked about their gender and, as shown in Table 2, nearly 85% of the English survey participants were male (85.2%), where the percentages of male and female respondents to the Arabic survey were more close, 60.3% and 39.7% respectively.

Region. Participants of the English and Arabic surveys were asked in what country they live. Participants of the later survey were additionally asked about their birth countries, in case they currently live in different countries than the ones where they were born. Participants were asked this question, because more than 15 million migrants left their home countries to work in the Gulf region (Rahman, 2010). According to the Measuring the Information Society Report 2015 (ITU, 2015), ITU Member States comprise six geographic regions: Africa, Americas, Arab States, Asia and the Pacific, Commonwealth of Independent States (CIS), and Europe. Additionally, based on *World Economic Situation and Prospects* (2015) and *Internet Usage Statistics for all the Americas* (2015), the Americas region can be also considered two regions: North America and Latin America and the Caribbean. As a result, this study will analyze the data based on dividing countries into the following seven regions: Africa, Arab States, Asia and the Pacific, CIS, Europe, Latin America and the Caribbean, and North America. Data provided in Table 4 show that 43.8% of the English survey participants live in North America, followed by 20.1% in Europe, while 94.3% of the Arabic survey participants

live in the Arab States region. The details of all the regions the participants live in are listed in Table 4; however, in order to conduct a comparative analysis between regions, the ones where few participants live will be excluded from the analysis. In the English survey, the regions that will be included in the analysis are North America, Europe, Asia and the Pacific, and Latin America and the Caribbean and the regions that will be excluded are Africa, Arab States, and CIS. In the Arabic survey, the region that will be included in the analysis is Arab States and the regions that will be excluded are Africa, Asia and the Pacific, CIS, Europe, Latin America and the Caribbean, and North America.

*Country Classification***.** Based on the *World Economic Situation and Prospects* (2015), countries are classified to three categories. As seen in Table 4, about 66% of the English survey participants live in countries classified as developed economies, followed by 31% who live in developing economies countries; on the other hand, 99.1% of the Arabic survey participants live in countries classified as developing economies. The details of all the categories are listed in Table 4; however, the ones that have few participants will be ignored in the analysis, such as Developed economies and Economies in transition in the Arabic survey.

Elzawi and Wade (2012) mentioned that lack of English proficiency is one of the major reasons that prevent people in Arab countries like Libya from utilizing online educational materials. Mirza and Al-Abdulkareem (2011) also noted that countries in the Middle East, in general, were later adopters of the Internet. Accordingly, participants of the Arabic survey were asked about their English language proficiency and computer and Internet access.

Table 4: List of Country Classifications and Regions

Measures and items	English Survey (edX)		Arabic Survey (Rwaq)	
	Frequency	Percentage	Frequency	Percentage
Country Classification				
Developed economies	1365	65.7	5	0.7
Developing economies	644	31.0	670	99.1
Economies in transition	68	3.3	1	0.1
Region				
North America	906	43.8	1	0.2
Europe	417	20.1	17	2.6
Asia and the Pacific	392	18.9	6	0.9
Latin America and the Caribbean	229	11.1	0	0
Commonwealth of Independent States (CIS)	60	2.9	0	0
Africa	33	1.6	14	2.1
Arab States	33	1.6	625	94.3

English Language Proficiency. Only respondents of the Arabic survey were asked about their proficiency with the English language and were given the following options: native English speaker or equivalent, sufficient for most situations, sufficient for limited situations, knowledge of a few phrases, and none. The majority of the participants had limited English proficiency as nearly 80% of the subjects reported sufficient for limited situations (see Table 5), and none of them reported native English speaker or equivalent.

Computer Access. Participants were asked about the number of years they have been using computers in general and were given the following options: three to five years, two to three years, and less than a year. Data provided in Table 5 show that the majority of the participants have been using computers for several years and only 0.9% of them reported using computers for less than a year. Categories with only a few participants were excluded from the analysis.

Internet Access. Participants were asked how often they typically use the Internet and were given the following options: several times a day, every day, several times a week, once a week, and once a month or less. As seen in Table 5, nearly 90% of the participants use the Internet several times a day, where only 0.5% reported using the Internet only once a week or none of them reported once a month or less. Categories with a very few participants will be ignored in the analysis.

Table 5: English Proficiency and Access to Computer and the Internet

Measures and items	Arabic Survey (Rwaq)	
	Frequency	Percentage
English Language Proficiency		
None	16	2.3
Knowledge of a few phrases	125	18.2
Sufficient for limited situations	427	62.2
Sufficient for most situations	119	17.3
Native English speaker or equivalent	0	0
Computer Access: Number of years of using computers in general		
Less than a year	7	0.9
Two to three years	18	2.3
Three to five years	68	8.6
Five or more years	694	88.2
Internet Access: Frequency of using the Internet		
Every day	53	6.7
Once a week	4	0.5
Several times a day	704	89.5
Several times a week	26	3.3
Once a month or less	0	0

Mediator Variable

ICT Development Index (IDI). Based on the Measuring the Information Society Report 2015 (ITU, 2015) issued by ITU, each country is assigned IDI rank and value and in this study IDI is operationalized as the IDI value. The study employs the Measuring the Information Society Report issued in 2015, because the IDI values in this report are based on data regarding the year 2014 (ITU, 2015), which is the same year the OLRSs were conducted. As seen in Table 3 and Appendix C, countries classified as developed economies have higher IDI values than the ones classified as developing economies.

Control Variables

Previous studies showed that some of the learner demographics, such as education and age, might affect learner Internet skills (Van Deursen, van Dijk, & Peters, 2011), which in turn could affect their OLR. Hargittai (2002) found that young people have higher Internet skills than older users. Additionally, Van Deursen, van Dijk, & Peters (2011) argue that globally education level is the most consistent predictable variable in terms of engagement with ICTs, and previous studies (Buente & Robbin, 2008; Robinson, DiMaggio, & Hargittai, 2003) illustrated how education level is associated with consistent use of the Internet for activities related to work and informing tasks. Concerning course subject, Xu and Jaggars, (2013) found that some academic subject areas appeal mostly to learners who adapt well to online coursework, while other subject areas appeal to less-adaptable learners. Based on the abovementioned research, in the analysis, the study will control for the effect of the following variables:

Level of education. Participants were asked about the highest levels of education they completed and many of the English and Arabic survey participants, (71.8%) and (63.3%) respectively, had a bachelor's degree or higher (see Table 2).

Age. Respondents were asked in what year they were born and accordingly the responses were categorized into the following age groups: under 25, 25-35, 36-49, and 50 or older. About 33% of English survey participants were between 25 and 35 years old and 19.8% were under 25 years old. Around 44% of Arabic survey participants were between 25 and 35 years old and 38.6% were under 25 years old (see Table 2).

Course Subject. Participants were categorized based on the subject of the course they enrolled in and, as shown in Table 1, participants of the English survey enrolled in a linear algebra MOOC, where many of the Arabic survey participants enrolled in photography and filmmaking MOOCs.

Statistical Analysis for the OLRS

In this study, data were analyzed using SPSS and AMOS. Descriptive analysis was used to summarize the respondents' demographic data. Several univariate general linear regression model (GLM) tests, using SPSS, were employed to answer RQ1, RQ3, and RQ4. To answer RQ2 and investigate the direct effects of region and the IDI and indirect effect of region on OLR, AMOS was utilized and the significance levels of these effects were evaluated using bootstrapping. Since this study analyzes a large sample size (N = 2,496), normality assumption is not a concern, because regression is fairly robust to its violation (Keith, 2015; Kline, 1998).

Conducting the Online Interaction and Satisfaction Survey (OISS)

As illustrated in Table 6, the OISS was sent to learners enrolled in MOOCs offered by UT, through edX, in fall 2013. The MOOCs covered different subject matters and most of them were introductory-level courses. The number of the primary instructors of each course ranged from one to three and the course length ranged from nine to fifteen weeks. Each MOOC had two teaching assistants and all of them were offered in English only.

By the end of each MOOC, an announcement via email was sent to all enrolled learners that included a link to the survey. The email announcement was sent to all learners regardless of whether or not they were active in the course or completed it. To achieve a diverse representation, the survey was sent to all the learners in the four MOOCs offered by UT in fall 2013. The total number of enrolled learners was 114,251 and the survey email announcement was sent to all of them. However, the number of learners who did not dropout of the MOOC and remained active until the end was much less than the initial number, especially since these four MOOCs were tuition-free courses. The number of learners who received certificates of achievement was about 9,288, which represents around 8% of the total enrolled MOOC learners. This is a common percentage of completion in MOOCs as the expected MOOC retention rate is between 2 and 10 percent (Reich, 2014). The total number of the survey participants was 2,061. Data provided in Table 6 show that the response rates were between 7.4% and 42.7% (see Table 6) and were calculated by dividing the number of learners who filled out the survey by the number of recipients of the certificates of achievement. Three out of the four MOOC response rates were higher than the common response rate (19.8%) for web-based surveys (Sax, Gilmartin, and Bryant 2003) and recent studies that surveyed MOOC

learners online (e.g., Christensen et al., 2013; Liu et al., 2014) reported low response rates.

Among the 2,085 cases of the study survey, 299 were deleted due to invalid data. The survey participants were asked about their level of satisfaction with the MOOC and later on during the survey were asked about their level of dissatisfaction with the MOOC. The responses included 299 cases where the participants indicated that they were satisfied as well as dissatisfied with the MOOC. These cases were considered invalid and were deleted.

Table 6: Description of Four of the Nine Surveyed MOOCs

No.	Course Subject	Semester	Year	Survey Language	MOOC Provider	No. of Enrolled Learners	Survey Topic	No. of Learners Completed the MOOC/ Certificates Issued	No. of Survey Participants	Response Rate
6	Energy and Earth Sciences	Fall	2013	English	edX	33,882	OISS	4,707	978	20.7%
7	Arts and Culture	Fall	2013	English	edX	32,479	OISS	1,000	427	42.7%
8	Health and Safety	Fall	2013	English	edX	18,256	OISS	2,008	148	7.4%
9	Business and Management	Fall	2013	English	edX	29,634	OISS	1,573	532	33.8%

Profile of Participants

Table 7 illustrates the demographic profiles of the 1,786 participants and the number of hours they spent per week engaged in the MOOC. Nearly 53% of the participants were under 36 years old. In terms of the highest level of education, the majority of learners are degree holders; about 90% of them had some college degree or higher. In regard to learners' primary occupation, the analysis revealed that the majority of the learners were employees (59.9%), followed by college students (22.5%). The survey questions about the highest level of education and primary occupation included several categories. The categories that were close to each other and showed no significant differences across all the dependent variables were aggregated. Table 7 shows the aggregated categories of these two variables.

Table 7. Learner Demographics and Hours Spent per Week Engaged in the MOOC.

Measures and items	Frequency	Percentage
Age		
Under 25	448	25.1
26-35	497	27.9
36-49	405	22.7
50 or older	432	24.2
Highest Level of Education		
Some high school/high school diploma/GED	172	9.7
Some college/bachelor's degree	760	42.7
Professional/master/doctoral degree or equivalent	847	47.6
Primary Occupation		
None/unemployed	128	7.2
High school student	47	2.6
College student	400	22.5
Employee	1065	59.9
Retiree	137	7.7
Hours spent per week engaged in the course		
Less than 2 hours	224	12.6
2 - 4 hours	857	48.1
5 - 7 hours	479	26.9
8 – 10 hours	150	8.4
More than 10 hours	73	4.1

Measures of Key Variables in the OISS

As MOOCs are a recent educational innovation, very limited research is available on learners' experience with MOOCs and which features MOOC learners consider important and might increase their satisfaction with these courses. Therefore, this study adopted field-tested questionnaire items used previously to investigate factors that influence learner satisfaction with online learning systems. Items were mainly adopted from surveys conducted by Palmer and Holt (2009) and Sun et al. (2008). The survey sought information concerning the following topics: interactions with teaching staff, other students, and MOOC content; teaching and learning aspects of the MOOC; course usefulness; course flexibility (e-learning course flexibility); and learner demographics.

For topics on the interactions with teaching staff, other students, and MOOC content, as well as teaching and learning aspects of the MOOC, the survey included questionnaire items seeking information concerning learner satisfaction with these items and the importance of each of them to the learner. The survey also included questionnaire items seeking learner agreement level with the course usefulness, course flexibility, and satisfaction with the MOOC. Each of these items was measured on a 5-point Likert-type scale. The values of the scale ranged from 1 = very unimportant to 5 = very important for the importance scale, 1 = very dissatisfied to 5 = very satisfied for the satisfaction scale, and 1 = strongly disagree to 5 = strongly agree for the level of agreement scale.

As presented in Table 8 and Appendix E, this study includes nine variables. The first is about learner satisfaction with the MOOC (satisfied with the course), followed by five variables indicating learners' satisfaction levels with interaction with teaching staff (interacting with teaching staff online), other students (feelings of support and assistance from other students in the course), and MOOC content (organizing and being responsible for your own learning, and being able to access online/digital learning resources after the

course ends) as well as teaching and learning aspects of the MOOC (relating what is learned to issues in the real world, and making connections to existing knowledge/experience). The last three variables represent learners' level of agreement with the course usefulness (this course supported ability to think deeply and solve problems) and course flexibility (taking this course online allowed me to take a course I would otherwise have to miss, and the advantages of taking this course online outweigh other disadvantages). As illustrated in Appendix E, the teaching and learning aspects of the MOOC variable is composed of two items. Reliability analysis was examined using Cronbach's alpha for these two items; the reliability coefficient was .84, which represents a good internal consistency (Sun et al. 2008).

Pearson's correlation analysis

Data illustrated in Table 8 show the means, standard deviation, sample size, and correlations between nine variables. The mean score of learner satisfaction with the MOOC is 4.6, which is fairly high. The course usefulness variable ($r = .48$, $p < .001$) has the highest correlation to the satisfaction with the course variable, followed by the teaching and learning aspects of the MOOC variable ($r = .46$, $p < .001$). Furthermore, all nine variables demonstrated significant relationships with satisfaction with the course variable.

Table 8: Descriptive Statistics and Correlation among Study Variables

Variables	Means	SD	N	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Satisfied with the course	4.60	.67	1786								
(2) Interacting with teaching staff online	3.55	.91	1725	.23*							
(3) Feelings of support and assistance from other students in the course	3.51	.88	1723	.16*	.58*						
(4) Organizing and being responsible for your own learning	4.47	.70	1741	.38*	.24*	.22*					
(5) Being able to access online/digital learning resources after the course ends	4.33	.81	1732	.38*	.31*	.26*	.37*				
(6) Teaching and learning aspects of the MOOC	4.48	.64	1747	.46*	.30*	.25*	.54*	.53*			
(7) This course supported ability to think deeply and solve problems	4.22	.72	1784	.48*	.28*	.24*	.31*	.32*	.40*		
(8) The advantages of taking this course online outweigh other disadvantages	4.26	.87	1781	.27*	.02	.02	.19*	.12*	.23*	.25*	
(9) Taking this course online allowed me to take a course I would otherwise have to miss	4.23	1.00	1779	.25*	.04	.06º	.14*	.12*	.17*	.18*	.23*

Note: ºp < .05; *p < .001.

Control Variables

Number of hours spent engaged in a MOOC. Respondents were asked about the number of hours they spent per week engaged in the MOOC. Data provided in Table 7 indicate that nearly 48% of the learners spent from two to four hours per week engaged in the MOOC, followed by learners who spent five to seven hours (26.9%).

Confidence in learning online. Respondents were asked about their confidence in learning through online courses. The responses were measured on a 5-point Likert-type scale, where 1 = strongly disagree to 5 = strongly agree. The results showed that most of them were confident learning via online course (M = 4.56; SD = 0.62).

Statistical Analysis for the Online Interaction and Satisfaction Survey (OISS)

Data for this study were analyzed using SPSS. Descriptive analysis was employed to summarize the participants' demographic data. Pearson's correlation analysis and stepwise multiple linear regression analysis were performed to examine correlations between variables and answer RQ5, RQ6, H1, H2, H3, and H4. Several univariate general linear regression model (GLM) tests were conducted to answer RQ7, RQ8, RQ9, and RQ10. analyze the data. The assumptions of univariate GLM tests were met. Due to this study's large sample size (N = 1,786), assumption of normality is not an issue, since regression is fairly robust to its violation (Keith, 2015; Kline, 1998). Furthermore, the study utilized the variance inflation factor (VIF) to examine the multicollinearity among the independent variables. Since the value of the VIF for each independent variable was less than 2, there was no need to attend to multicollinearity.

Chapter 4: What Effects Learner Online Readiness?

This chapter presents the results of the online learning readiness survey that was conducted to investigate MOOC learner readiness for online learning. The results of the survey address RQ1, RQ2, RQ3, and RQ4. For RQ1, I investigate the similarities and differences among MOOC learners from either different regions or country classifications with regard to learners' ICTs engagement, self-efficacy, and locus of control. Through RQ2, I examine whether gender moderates the relationship between either region or country classification and MOOC learner ICTs engagement. Next, in RQ3 I evaluate the mediation model to test whether the ICT development index (IDI) values mediate the readiness for online learning among MOOC learners from different countries. Finally, through RQ4 I investigate, in the Arabic survey, the effects of MOOC learner English fluency, computer access, and Internet access on level of engagement with ICTs.

Effects of Region on MOOC Learner ICTs Engagement, Self-Efficacy, and Locus of Control

RQ1: What are the similarities and differences among MOOC learners from different regions or country classifications in terms of levels of engagement with ICTs, self-efficacy, and locus of control?

The first part of RQ1 investigates the similarities and differences among MOOC learners from different regions of ICTs engagement, self-efficacy, and locus of control. Three univariate general linear regression model (GLM) tests with region as a fixed factor and the ICTs engagement, self-efficacy, and locus of control factors as dependent variables in each separate test were conducted to investigate the effect of region on each dependent variable. To account for the possible confounding of variables in the three tests, age, level of education, and gender were included as fixed factors. The tests of the

main effects were examined. After running each of the univariate GLM tests, follow-up Tukey's post hoc tests were performed to explore the pairwise differences among the adjusted means for the different regions.

Region and MOOC Learner ICTs Engagement

As illustrated in Table 9, while controlling for the effects of level of education, age, and gender, the main effect of region on MOOC learner ICTs engagement was significant, $F(4, 2526) = 30.56$, $p < .001$. As seen in Table 10, follow-up tests indicated significant differences among learners who live in the Arab States region and the European, Latin American and the Caribbean, and North American regions. For instance, learners who live in Arab States have significantly lower levels of engagement with ICTs than learners who live in North America and Europe and significantly higher levels than learners who live in Latin America and the Caribbean. However, there was no significant difference between learners who live in Arab States and Asia and the Pacific. Additionally, there were significant differences between learners who live in North America and learners who live in the two regions Asia and the Pacific and Latin America and the Caribbean, but no significant difference between learners who live in North America and Europe. Learners who live in North America have significantly higher levels of engagement with ICTs than learners who live in Asia and the Pacific and Latin America and the Caribbean. Learners who live in Europe have higher levels of engagement with ICTs than learners who live in Asia and the Pacific and Latin America and the Caribbean. Learners who live in Asia and the Pacific have significantly higher levels of engagement with ICTs than learners who live in Latin America and the Caribbean. Furthermore, the effects of the control variables, level of education, age, and gender, on MOOC learner ICTs engagement were significant (see Table 9). Learners who

have at least some college, who are between the age group 25-35 years, and male learners have higher levels of engagement with ICTs than do other learners.

Region and MOOC Learner Self-Efficacy

As demonstrated in Table 9, while controlling for the effects of level of education, age, and gender, the main effect of region on MOOC learner self-efficacy was significant, $F(4, 2526) = 24.47$, $p < .001$. As seen in Table 10, follow-up tests indicated significant differences among learners who live in the North American region and learners who live in the Arab States and Europe, Asia and the Pacific, or Latin American and the Caribbean regions. Learners who live in North America have significantly higher self-efficacy than learners who live in Arab States, Europe, Asia and the Pacific, and Latin America and the Caribbean. Moreover, the effects of the control variables, level of education and gender, on MOOC learner self-efficacy were significant, but the effect of age was not (see Table 9). Learners who have a professional, master's, or doctoral degree, and male learners have higher self-efficacy than do other learners.

Region and MOOC Learner Locus of Control

As illustrated in Table 9, while controlling for the effects of level of education, age, and gender, the main effect of region on MOOC learner locus of control was significant, $F(4, 2526) = 16.14$, $p < .001$. As seen in Table 10, follow-up tests indicated significant differences among learners who live in the Arab States region and the North American, European, and Latin American and the Caribbean regions. Learners who live in Arab States have significantly lower locus of control than learners who live in North America, Europe, and Latin America and the Caribbean; however, there was no significant difference between learners who live in Arab States and Asia and the Pacific.

Furthermore, learners who live in North America have significantly higher locus of control than learners who live in the two regions Europe and Asia and the Pacific, but no significant difference between learners who live in North America and Latin America and the Caribbean. There were no significant differences between learners who live in Europe and Asia and the Pacific or Europe and Latin America and the Caribbean. There was no significant difference between learners who live in Asia and the Pacific and Latin America and the Caribbean. Furthermore, the effects of the control variables, level of education and age, on MOOC learner locus of control were significant, but the effect of gender was not (see Table 9). Learners who have a professional, master's, or doctoral degree and who are 50 years old and older have higher locus of control than do other learners.

Table 9: Effects of Region on MOOC Learners' ICTs Engagement, Self-Efficacy, and Locus of Control

Dependent Variables	ICTs Engagement		Self-Efficacy		Locus of Control	
	F	η2	*F*	η2	*F*	η2
Region	$F(4, 2526) = 30.56^{*}$	.05	$F(4, 2526) = 24.47^{*}$	.04	$F(4, 2526) = 16.14^{*}$	.03
Level of education	$F(4, 2526) = 7.04^{*}$	.01	$F(4, 2526) = 6.42^{*}$	.01	$F(4, 2526) = 6.77^{*}$	.01
Age	$F(3, 2526) = 3.06^{º}$	<.01	$F(3, 2526) = 1.73$	<.01	$F(3, 2526) = 3.86^{×}$	.01
Gender	$F(1, 2526) = 6.48^{º}$	<.01	$F(1, 2526) = 10.10^{×}$	<.01	$F(1, 2526) = 2.03$	<.01

Note: $^{º}p < .05$; $^{×}p < .01$; $^{*}p < .001$.

Table 10: Regions and Estimated Marginal Means of MOOC Learner ICTs Engagement, Self-Efficacy, and Locus of Control

Region	ICTs Engagement	Self-Efficacy	Locus of Control
	Mean (SE)	Mean (SE)	Mean (SE)
Europe	3.35 (0.03)	3.01 (0.03)	3.05 (0.03)
North America	3.30 (0.03)	3.25 (0.02)	3.16 (0.02)
Asia and the Pacific	3.10 (0.04)	3.02 (0.03)	3.03 (0.03)
Arab States	3.11 (0.03)	3.12 (0.02)	2.95 (0.02)
Latin America and the Caribbean	2.89 (0.04)	3.04 (0.03)	3.14 (0.03)

Note: The values of each subscale ranged from 1 = strongly disagree to 4 = strongly agree.

Effects of Country Classification on MOOC Learner ICTs Engagement, Self-Efficacy, and Locus of Control

The second part of RQ1 explores the similarities and differences among MOOC learners from different class classifications in terms of ICTs engagement, self-efficacy, and locus of control. Three univariate (GLM) tests with country classification as a fixed factor and the ICTs engagement, self-efficacy, and locus of control factors as dependent variables in each separate test were conducted to investigate the effect of country classification (developed economies, economies in transition, and developing economies). To account for the possible confounding of variables in the three tests, age, level of education, and gender were included as fixed factors. The tests of main effects were examined. After running each of the univariate GLM tests, follow-up Tukey's post hoc tests were performed to explore the pairwise differences among the adjusted means for the different country classification categories.

Country Classification and MOOC Learner ICTs Engagement

As illustrated in Table 11, while controlling for the effects of level of education, age, and gender, the main effect of country classification on MOOC learner ICTs engagement was significant, $F(2, 2705) = 53.44$, $p < .001$. Follow-up tests revealed that learners who live in developed economies have significantly higher levels of engagement with ICTs than learners who live in developing economies (see Table 12). The effects of the control variables, level of education, age, and gender, on MOOC learner ICTs engagement were also significant (see Table 11). Learners who have at least some college, who are between the age group 25-35 years, and male learners have higher levels of engagement with ICTs than do other learners.

Country Classification and MOOC Learner Self-Efficacy

As illustrated in Table 11, while controlling for the effects of level of education, age, and gender, the main effect of country classification on MOOC learner self-efficacy was significant, $F(2, 2705) = 19.31$, $p < .001$. Follow-up tests indicated that learners who live in developed economies have significantly higher self-efficacy than learners who live in developing economies (see Table 12). Moreover, the effects of the control variables, level of education and gender, on MOOC learner self-efficacy were significant, but the effect of age was not (see Table 11). Learners who have a professional, master's, or doctoral degree and male learners have higher self-efficacy than do other learners.

Country Classification and MOOC Learner Locus of Control

As illustrated in Table 11, while controlling for the effects of level of education, age, and gender, the main effect of country classification on MOOC learner locus of control was significant, $F(2, 2705) = 10.63$, $p < .001$. Follow-up tests indicated that learners who live in developed economies have significantly higher locus of control than learners who live in developing economies (see Table 12). The effects of the control variables, level of education and age, on MOOC learner locus of control were also significant, but the effect of gender was not (see Table 11). Learners who have a professional, master's, or doctoral degree and who are 50 years old and older have higher locus of control than do other learners.

Table 11: Effects of Country Classification on MOOC Learners ICTs Engagement, Self-Efficacy, and Locus of Control

Dependent Variables	ICTs Engagement		Self-Efficacy		Locus of Control	
	F	η2	*F*	η2	*F*	η2
Country Classification	$F(2, 2705) = 53.44^{*}$	.04	$F(2, 2705) = 19.31^{*}$	.01	$F(2, 2705) = 10.63^{*}$	.01
Level of education	$F(4, 2705) = 5.85^{*}$	.01	$F(4, 2705) = 5.95^{*}$	.01	$F(4, 2705) = 5.64^{*}$	.01
Age	$F(3, 2705) = 3.70^{º}$	<.01	$F(3, 2705) = 1.80$	<.01	$F(3, 2705) = 5.69^{×}$	.01
Gender	$F(1, 2705) = 4.39^{º}$	<.01	$F(1, 2705) = 4.20^{º}$	<.01	$F(1, 2705) = 0.84$	<.01

Note: $^{º}p < .05$; $^{×}p < .01$; $^{*}p < .001$.

Table 12: Country Classification and Estimated Marginal Means of MOOC Learner ICTs Engagement, Self-Efficacy, and Locus of Control

Country Classification	ICTs Engagement	Self-Efficacy	Locus of Control
	Mean (SE)	Mean (SE)	Mean (SE)
Developed economies	3.32 (0.02)	3.18 (0.02)	3.11 (0.02)
Developing economies	3.05 (0.02)	3.08 (0.02)	3.02 (0.02)

Note: The values of each subscale ranged from 1 = strongly disagree to 4 = strongly agree.

Effect of Gender

RQ2: To what extent does gender moderate the relationship between region and MOOC learner ICTs engagement or between country classification and MOOC learner ICTs engagement?

The first part of RQ2 investigates whether the effect of region on MOOC learner ICTs engagement differs between genders. A univariate GLM test with region as a fixed factor and ICTs engagement as a dependent variable was conducted to investigate the effect of gender. The second part of RQ2 examines whether the effect of country classification on MOOC learner ICTs engagement differs between female and male learners. A univariate GLM test with country classification as a fixed factor and MOOC learner ICTs engagement as a dependent variable was conducted to investigate the effect of gender. To account for the possible confounding of variables in these tests, the variables of age, level of education, and gender were included as fixed factors. Tests of two-way interaction and main effects were examined. After running each of the univariate GLM tests, significant two-way interaction was followed up with profile analysis to evaluate the pairwise differences among the adjusted means for male and female MOOC learners.

Effect of Gender on the Relationship between Region and MOOC Learner ICTs Engagement

As shown in Table 13, while controlling for the effects of level of education, age, and gender, the interaction between region and gender on MOOC learner ICTs engagement was significant, $F(4, 2522) = 3.75$, $p < .01$. Follow-up tests revealed that MOOC male learners who live in North America, Asia and the Pacific, and Latin America and the Caribbean have significantly higher levels of engagement with ICTs

than female learners. However, there was no significant difference between male and female learners who live in Arab States or Europe (see Figure 5).

Table 13: Effect of Gender on the Relationship between Region and MOOC Learner ICTs Engagement

Dependent Variables	ICTs Engagement	
	F	η2
Region	$F(4, 2522) = 11.44^{*}$	.02
Region x Gender	$F(4, 2522) = 3.75^{\times}$	.01
Level of education	$F(4, 2522) = 7.39^{*}$	.01
Age	$F(3, 2522) = 3.30^{o}$	<.01
Gender	$F(1, 2522) = 0.89$	<.01

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

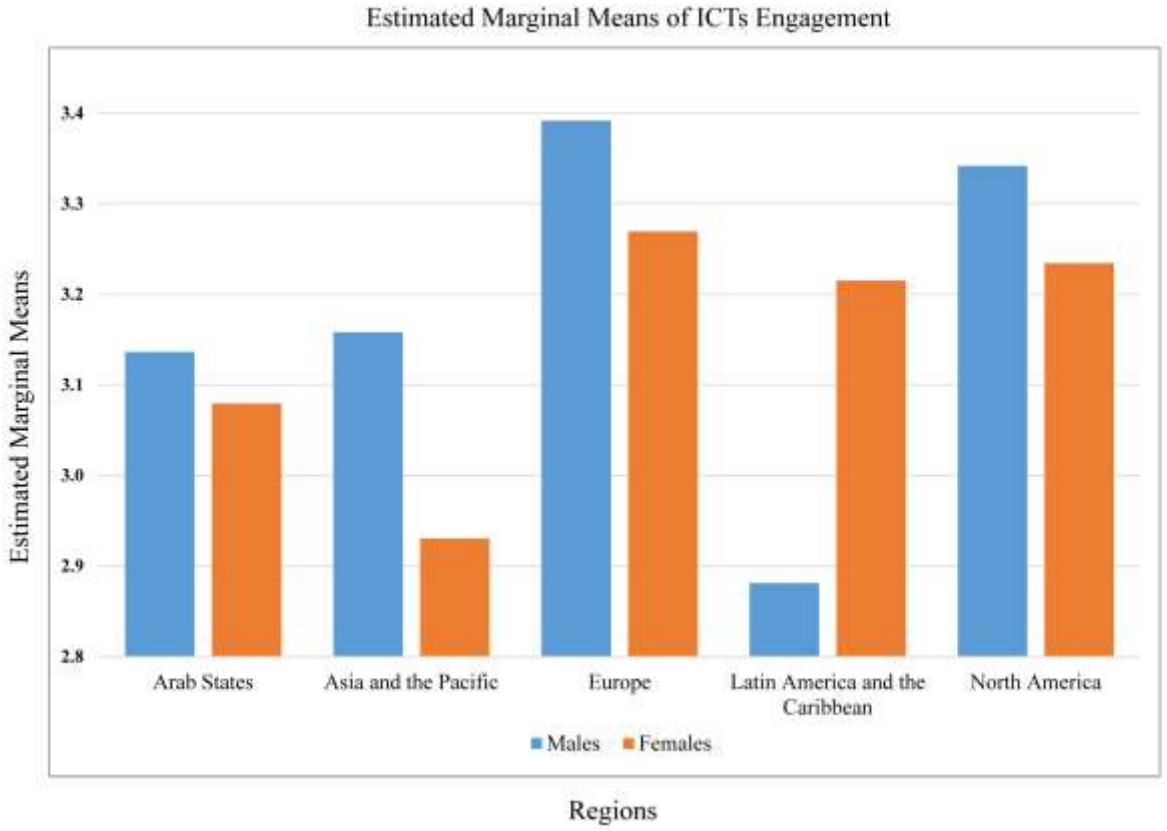

Figure 5: Estimated Marginal Means of MOOC Learner ICTs Engagement by Region and Gender.

Note. The number of survey participants who live in the Arab States = 625 (24.3%), Asia and the Pacific = 392 (15.3%), Europe = 417 (16.2%), Latin America and the Caribbean = 229 (8.9%), and North America = 906 (35.3%).

Effect of Gender on the Relationship between Country Classification and MOOC Learner ICTs Engagement

As illustrated in Table 14, while controlling for the effects of level of education, age, and gender, the interaction between country classification and gender on MOOC learner ICTs engagement was not significant, $F(2, 2703) = 1.10$, $p > .05$.

Table 14: Effect of Gender on the Relationship between Country classification and MOOC Learner ICTs Engagement

Dependent Variables	ICTs Engagement	
	F	η2
Country Classification	$F(2, 2703) = 30.34$*	.02
Country Classification x Gender	$F(2, 2703) = 1.10$	<.01
Level of education	$F(4, 2703) = 5.89$*	.01
Age	$F(3, 2703) = 3.82$º	<.01
Gender	$F(1, 2703) = 0.45$	<.01

Note: º$p < .05$; ˣ$p < .01$; *$p < .001$.

Effect of the IDI on the Relationship between Region and MOOC Learner Online Learning Readiness

RQ3: How does the IDI mediate the differences in online learning readiness among MOOC learners from different regions?

The third research question investigates the impact of region on MOOC learner online learning readiness, both directly and indirectly through the ICT development index (IDI). A mediation model was performed, using AMOS, to study how the IDI mediates the online learning readiness (OLR) of MOOC learners from different regions. The model included a categorical predictor variable (region), a continuous mediator variable (IDI), and a dependent variable (OLR); the model also controlled for the effect of gender and examined whether gender moderated the effect of region on OLR. For the region variable, two regions were chosen as reference groups (Arab States and North America), since 59.6% of the survey participants live in these two regions and enrolled in MOOCs offered through providers located in these regions. To facilitate the analysis in this model, the rest of the regions were aggregated in a group called Other Regions. The model was run with the two reference groups to get all possible pairwise comparisons of the region variable. Squared multiple correlation (SMC) was utilized to measure the mediation model fit, because SMC is mainly independent of sample size and not a scale bound (Hayes, 2013). All independent variables in the model were allowed to be correlated. The model accounted for 38.2% of the variance of the IDI values and 11% of the OLR values. Generally, the model showed significant differences between the three region groups in terms of the IDI and OLR values.

Figure 6 shows the standardized path coefficients mediation model with the Arab States region as the reference group; Figure 7 shows it with the reference group North America. The results of the mediation model show that North America and Other

Regions have significantly higher IDI values than Arab States, (β = 2.98, SE= 0.08, p < .001) and (β = 0.80, SE= 0.08, p < .001) respectively. Other Regions has significantly less IDI value than North America (β = -2.19, SE= 0.07, p < .001). Additionally, MOOC learners who live in North America and Other Regions have significantly higher OLR values than learners who live in Arab States, (β = 0.32, SE= 0.06, p < .001) and (β = 0.27, SE= 0.06, p < .001) respectively.

As shown in Table 15, some of the regions have significant direct effects on the IDI and indirect effects on OLR. For example, with the reference group Arab States, North America and Other Regions have positive direct effects on both the IDI and OLR and have positive indirect effects (through the mediation of the IDI) on OLR. The findings indicated that MOOC learners who live in countries with high IDI values, such as some countries in North America, have higher readiness for online learning than learners who live in countries with low IDI values, such as countries in Arab States. With the reference group North America, Other Regions has a negative direct effect on the IDI and a negative indirect effect (through the mediation of the IDI) on OLR. Additionally, the IDI has a positive direct effect on OLR (see Table 15). On the other hand, neither affects OLR nor moderates the direct effect of the region variable on OLR.

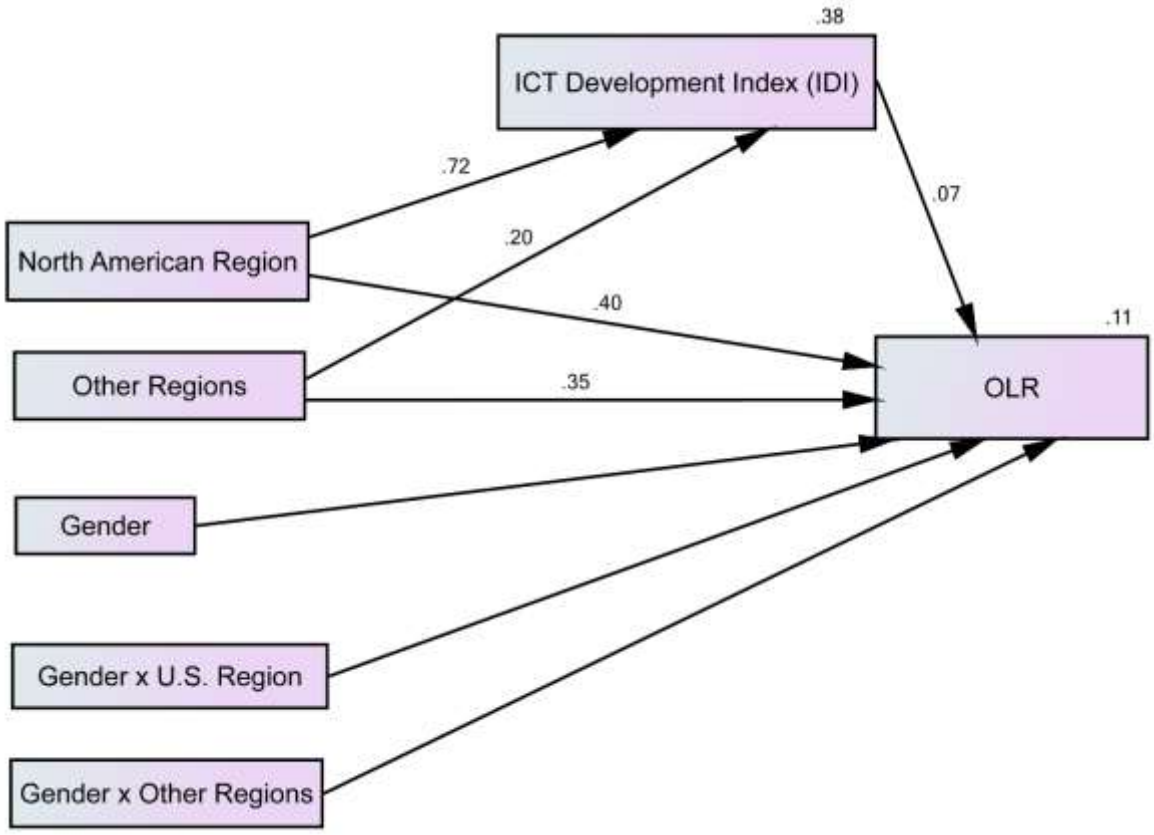

Figure 6: Mediation Model A, with Reference Group Arab States (Standardized Regression Coefficients).

Notes. In this figure, only values of significant standardized path coefficients were shown and they ranged from 0.07 to 0.72. The R^2 values of the mediator variable ICT Development Index (IDI) and dependent variable OLR are 0.38 and 0.11 respectively.

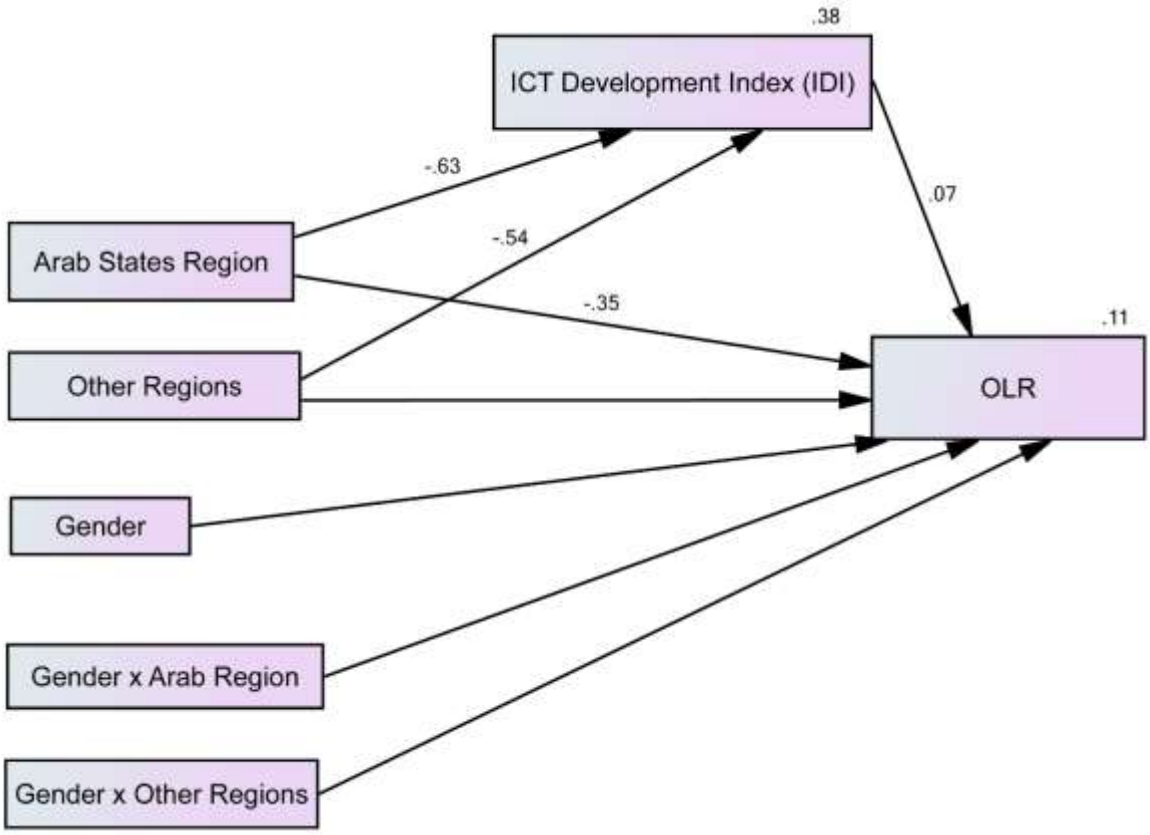

Figure 7: Mediation Model B, with Reference Group North America (Standardized Regression Coefficients).

Notes. In this figure, only values of significant standardized path coefficients were shown and they ranged from 0.07 to 0.63. The R^2 values of the mediator variable ICT Development Index (IDI) and dependent variable OLR are 0.38 and 0.11 respectively.

Table 15: Direct and indirect (through the IDI) effects on OLR

Reference Group	Variable	Direct effect (region → IDI)	Direct effect (region → OLR)	Direct effect (IDI → OLR)	Indirect effect (region → IDI → OLR)
Arab States Region	North American Region	2.98*	0.32*		0.04#
Arab States Region	Other Regions	0.80*	0.27*		0.01#
North American Region	Arab States Region	-2.98*	-0.32*		-0.04#
North American Region	Other Regions	-2.19*			-0.03#
	IDI			0.01º	

Note: #$p < .05$; º$p < .01$; *$p < .001$.

Effects of English Proficiency, Computer Access, and Internet Access on MOOC Learner ICTs Engagement

RQ4: In the Arabic survey, to what extent do MOOC learner English proficiency, computer access, and Internet access predict their ICTs engagement?

The fourth research question explores to what degree English proficiency, computer access, and Internet access of MOOC learners can predict their ICTs engagement. A univariate GLM test with English proficiency, computer access, and Internet access as fixed factors and ICTs engagement as a dependent variable was conducted to investigate the effects of these three factors on ICTs engagement. To account for the possible confounding of variables in this test, age, level of education, and gender were included as fixed factors. Tests of the main effects were examined. After running the univariate GLM test, follow-up Tukey's post hoc tests were performed to explore the pairwise differences among the adjusted means for the independent variables of English proficiency, computer access, and Internet access.

As presented in Table 16, while controlling for the effects of level of education, age, and gender, the main effects of English proficiency and computer access on MOOC learner ICTs engagement were significant, $F(3, 636) = 13.30$, $p < .001$ and $F(2, 636) = 4.94$, $p < .01$, respectively, but the effect of Internet access was not. As seen in Table 17, follow-up tests indicated significant differences between the English proficiency level sufficient for most situations and the three levels: none, knowledge of a few phrases, and sufficient for limited situations. There was a significant difference between the none level and sufficient for limited situations, but no significant difference between it and the knowledge of a few phrases level. There was a significant difference between the knowledge of a few phrases level and sufficient for limited situations. For computer

access, follow-up tests also revealed significant differences between MOOC learners who have been using a computer for five or more years and learners who have been using it for two to three years or three to five years; however, there was no significant difference between learners who have been using a computer for two to three years or three to five years. Furthermore, the effects of the control variables, level of education, age, and gender, on MOOC learner ICTs engagement were not significant (see Table 16).

Table 16: Effects of English Proficiency and Computer and Internet Access on MOOC Learner ICTs Engagement

Dependent Variables	ICTs Engagement	
	F	η2
English Proficiency	$F(3, 636) = 13.30^{*}$	.06
Computer Access	$F(2, 636) = 4.94^{\times}$	.02
Internet Access	$F(2, 636) = 1.57$	.01
Level of education	$F(3, 636) = 2.31$	.01
Age	$F(3, 636) = 1.36$	.01
Gender	$F(1, 636) = 3.35$	.01

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

Table 17**:** English Proficiency and Computer and Internet Access and Estimated Marginal Means of ICTs Engagement

Independent Variable	ICTs Engagement Mean (SE)
English Proficiency	
None	2.28 (0.16)
Knowledge of a few phrases	2.68 (0.08)
Sufficient for limited situations	2.85 (0.08)
Sufficient for most situations	3.03 (0.09)
Computer Access	
Two to three years	2.54 (0.14)
Three to five years	2.71 (0.10)
Five or more years	2.88 (0.07)
Internet Access	
Every day	2.65 (0.10)
Several times a week	2.69 (0.13)
Several times a day	2.79 (0.07)

Note: The values of the English proficiency variable ranged from 1 = none to 5 = native English speaker or equivalent, values of computer access ranged from 1 = less than a year to 4 = five or more years, and values of Internet access ranged from 1 = every day to 4 = several times a week.

Chapter 5: What Contributes to Online Interaction and MOOC Satisfaction?

This chapter shows the results of the online interaction and satisfaction survey employed to examine learners' satisfaction with certain MOOC features and online interaction with teaching staff, other learners, and course content. Additionally, the survey studies effects of MOOC learner age and level of education on their perception of the importance of factors related to online interaction and content. The results of the survey address four hypotheses and seven research questions. The first three hypotheses posit that learner satisfaction with learner-content, learner-instructor, and learner-learner interaction will positively impact their satisfaction with the MOOC. The fourth hypothesis predicts that the more the learner perceives usefulness of the MOOC, the more likely he or she will be satisfied with it. Research questions five and six explore MOOC features that learners consider important and impact their satisfaction. Regarding research questions seven, eight, nine, and ten, they investigate how MOOC learner age and level of education impact their perception with regard to the importance of five variables: online interaction with the teaching staff, feeling supported by other learners, being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC.

MOOC Features that Have Significant Influence on Online Learners' Satisfaction

To test the four hypotheses and answer the research questions RQ4 and RQ5, a stepwise multiple regression analysis was conducted, with eight variables used as independent variables, while the variable I am satisfied with the course was used as the dependent variable. These eight variables are: interacting with teaching staff online,

feelings of support and assistance from other students in the course, organizing and being responsible for your own learning, being able to access online/digital learning resources after the course ends, teaching and learning aspects of the MOOC, this course supported ability to think deeply and solve problems, the advantages of taking this course online outweigh other disadvantages, and taking this course online allowed me to take a course I would otherwise have to miss (see Table 8). Results of the regression analysis are shown in Table 18. Among the eight independent variables, six are significantly related to learner satisfaction with the course, with p-values less than .05.

H1: Learner satisfaction with learner-content interaction will positively influence learner satisfaction with the MOOC.

The first hypothesis asserts that learner satisfaction with learner-content interaction will positively predict learner satisfaction with the MOOC. The results showed that the two learner-content interaction variables, being able to access online/digital learning resources after the course ends (β = .12, p < .001) and organizing and being responsible for my own learning (β = .12, p < .001), positively influence learner satisfaction with the MOOC. Therefore, the hypothesis is supported.

H2: Learner satisfaction with learner-instructor interaction will positively influence learner satisfaction with the MOOC.

H3: Learner satisfaction with learner-learner interaction, in terms of feelings of support from other learners, will positively influence learner satisfaction with the MOOC.

The second and third hypotheses posit that learner satisfaction with learner-instructor and learner-learner interactions, with regard to feelings of support and assistance from other learners in the course, would positively predict learner satisfaction with the MOOC. As presented in Table 8, the Pearson's correlation coefficient analysis showed that each of these two variables demonstrated a significant relationship with satisfaction with the course variable. However, in the presence of the other independent variables, these two variables no longer explain a significant amount of variation in learner satisfaction, with p-values greater than .05. Hence, hypotheses two and three are not supported.

H4: Learner perceived usefulness of the MOOC will be positively associated with learner satisfaction with the MOOC.

The fourth hypothesis states that learner perceived usefulness of the MOOC would positively predict learner satisfaction with the MOOC. Data presented in Table 18 show that this hypothesis is supported as learner perceived usefulness of the MOOC significantly indicates learner satisfaction ($\beta = .29$, $p < .001$).

Table 18: Effects of Several Course Aspects on Course Satisfaction (n = 1692)

Independent Variables	Dependent variable: Satisfied With the Course	
	β	t-value
This course supported my ability to think deeply about ideas and to solve problems	0.29	13.13*
Teaching and learning aspects of the MOOC	0.18	6.66*
Taking this course online allowed me to take a course I would otherwise have to miss	0.13	6.18*
Being able to access online/digital learning resources after the course ends	0.12	5.29*
Organizing and being responsible for your own learning	0.12	4.88*
The advantages of taking this course online outweigh any disadvantages	0.09	4.27*
$F(6, 1685)$	160.16*	
R^2	.36	
Adjusted R^2	.36	

Note: °$p < .05$; ˣ$p < .01$; *$p < .001$.

RQ5: What MOOC features significantly influence online learners' satisfaction?

The fifth research question explores MOOC features that significantly influence learners' satisfaction. The results of the stepwise multiple regression analysis showed that among the eight independent variables, six are significantly related to learner satisfaction with the course with p-values less than .05 (see Table 18). These six variables are related to features about interaction with the course content, teaching and learning aspects of the MOOC, perception of usefulness of the MOOC, and course flexibility. The two variables that were not significantly related to learner satisfaction with the course are interaction with teaching staff and feeling supported by other students; they were omitted from Table 18.

MOOC Features Online Learners Consider Important and Are Satisfied with

Importance-Satisfaction Analysis

RQ6: What MOOC features are considered important and satisfactory to online learners?

The sixth research question investigates what MOOC features online learners consider important and are satisfied with. Therefore, learners were asked to rate the importance of and satisfaction with a range of elements related to the MOOC in which they are enrolled. Each of these elements was measured on a 5-point Likert-type scale. The survey questions about these elements were adopted from the Experiences of Learning Online (ELO) survey (Palmer and Holt 2009). Furthermore, this research followed studies conducted by Palmer and Holt (2009) and Aigbedo and Parameswaran

(2004) to interpret and visualize the importance-satisfaction data and grid. Data shown in Table 19 summarize the mean and standard deviation values of the importance and satisfaction ratings.

Table 19: Descriptive Statistics for Learner Importance-Satisfaction Data

Questionnaire item	Importance Mean (SD)	Satisfaction Mean (SD)
4. Teaching and learning aspects of the MOOC	4.53 (0.59)	4.48 (0.64)
3. Organizing and being responsible for your own learning	4.51 (0.68)	4.47 (0.70)
5. Being able to access online/digital learning resources after the course ends	4.39 (0.77)	4.33 (0.81)
1. Interacting with teaching staff online	3.51 (1.02)	3.55 (0.91)
2. Feelings of support and assistance from other students in the course	3.38 (1.04)	3.51 (0.88)

Note: Each variable was measured on two scales. The values of the importance scale ranged from 1 = very unimportant to 5 = very important and the satisfaction scale ranged from 1 = very dissatisfied to 5 = very satisfied.

Figure 8 shows the importance-satisfaction grid where importance and satisfactions ratings are plotted on the vertical and horizontal axes consecutively. The grid is divided into the following quadrants: A (high importance and low satisfaction), B (high importance and high satisfaction), C (low importance and high satisfaction), and D (low importance and low satisfaction). Furthermore, the grand mean values for all the importance ratings were used as a vertical divider where the horizontal divider was the grand mean of all satisfaction ratings. As illustrated in Figure 8, learners gave the highest importance and satisfaction values to the variable teaching and learning aspects of the MOOC and placed the lowest importance and satisfaction values on the variable feelings of support and assistance from other students in the course.

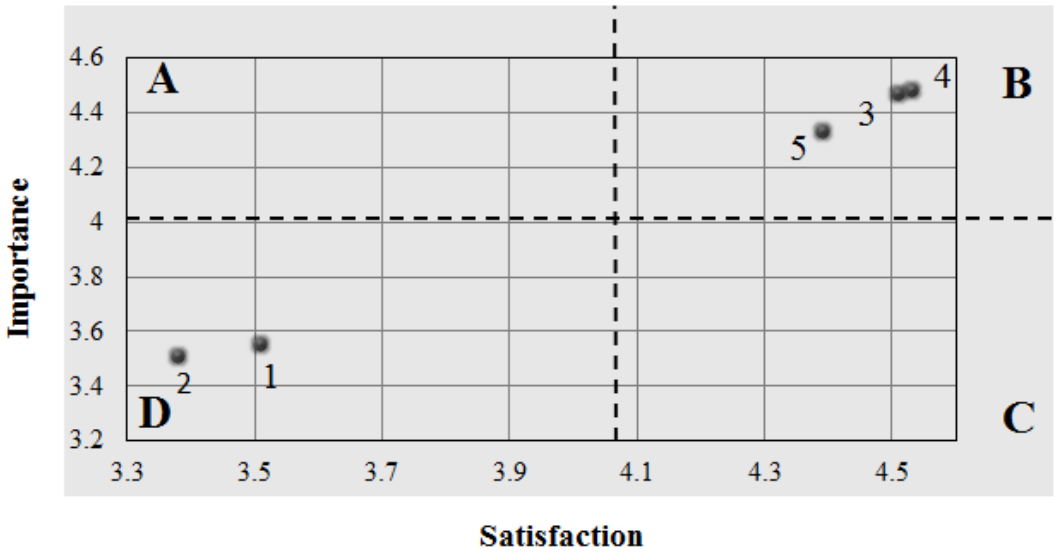

Figure 8: Importance-Satisfaction Grid

Notes. 1. Interacting with teaching staff online.

2. Feelings of support and assistance from other students in the course.

3. Organizing and being responsible for your own learning.

4. Teaching and learning aspects of the MOOC.

5. Being able to access online/digital learning resources after the course ends.

The Effects of Age and Level of Education of MOOC Learners on their Perceptions of Online Interaction

Effect of Age

RQ7: To what extent does the age of MOOC learners influence their perception of the importance of online interaction with the teaching staff or feeling supported by other learners after controlling for hours spent per week and confidence in learning online?

RQ8: To what degree does the age of MOOC learners influence their perception of the importance of being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online?

The seventh and eighth research questions investigate the effect of MOOC learners' age on their perception concerning the importance of the following variables: online interaction with the teaching staff, feeling supported by other learners, being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC, after controlling for the two variables hours spent per week and confidence in learning online. To answer these two research questions, five univariate (GLM) tests with age as a fixed factor and the above-mentioned variables as dependent variables in each separate test were conducted to examine the effect of age on these five dependent variables. To account for the possible confounding of variables, the number of hours the learners spent per week engaged in the course was included as a fixed factor and learner confidence in learning online as a covariate in all of the five tests. All two-way interactions were tested and any interaction that was not significant was removed from the final model. After conducting each of the univariate GLM tests, follow-up Bonferroni post hoc tests were conducted to evaluate the pairwise differences among the adjusted means for the different age groups. The follow-up tests indicated that learners in the age group 50 years old and older had the lowest

means for the importance of the five above-mentioned dependent variables (see Table 23).

Age and Interaction with Teaching Staff

As illustrated in Table 20, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of age on the importance of interaction with teaching staff was significant, $F(3, 1723) = 10.20$, $p < .001$. Follow-up tests indicated that learners in the age group 50 years old and older placed significantly less importance on interaction with teaching staff than learners in the other three groups; however, there was no significant difference between these other three age groups (see Table 22). While controlling for the effect of learner confidence in learning online, the interaction between age and hours spent per week on the importance of interaction with teaching staff was significant, $F(12, 1723) = 2.02$, $p < .05$.

Age and Feeling Supported by Other Students

As shown in Table 20, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of age on the importance of feeling supported by other students was significant, $F(3, 1716) = 4.05$, $p < .01$. Follow-up tests revealed that the age group 50 years old and older placed significantly less importance on feeling supported by other students than learners in two other groups (under 25 years and 26-35 years); however, there was no significant difference between the group 36-49 years and the rest of the groups (see Table 22). While controlling for the effect of learner confidence in learning online, the interaction between age and hours spent per week on the importance of feeling supported by other students was significant, $F(12, 1716) = 1.91$, $p < .05$.

Table 20: Effects of Age on Instructor and Learner Interaction

Dependent Variables	Interaction with Teaching Staff		Feeling supported by other students	
	F	η2	*F*	η2
Age	$F(3, 1723) = 10.20^{*}$	.02	$F(3, 1716) = 4.05^{\times}$	.01
Hours spent per week engaged	$F(4, 1723) = 17.98^{*}$	.04	$F(4, 1716) = 20.43^{*}$	.05
Confidence in learning online	$F(1, 1723) = 7.56^{\times}$	< .01	$F(1, 1716) = 2.50$	< .01
Age x Hours spent per week	$F(12, 1723) = 2.02^{o}$	.01	$F(12, 1716) = 1.91^{o}$	.01

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

Age and Learner Responsibility for Learning

As presented in Table 21, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of age on the importance of learner responsibility for learning was significant, $F(3, 1745) = 3.28$, $p < .05$. Follow-up tests revealed that the age group 50 years old and older placed significantly less importance on learner responsibility for learning than learners in the age group under 25 years; however, there were no significant differences between each of these two age groups and the rest of the age groups (see Table 22).

Age and Accessing Online Learning Resources after the Course Ends

As shown in Table 21, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of age on the importance of accessing the online learning resources after the course ends was significant, $F(3, 1739) = 8.77$, $p < .001$. Follow-up tests revealed that the age group 50 years old and older placed significantly less importance on accessing the online learning resources after the course ends than learners in two other groups (under 25 years and 26-35 years); however, there was no significant difference between the group 36-49 years and the rest of the groups (see Table 22).

Age and Teaching and Learning Aspects of the MOOC

As presented in Table 21, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of age on the importance of teaching and learning aspects of the MOOC was significant, $F(3, 1749) = 5.86$, $p < .01$.

Follow-up tests revealed that the age group 50 years old and older placed significantly less importance on teaching and learning aspects of the MOOC than learners in two other groups (under 25 years and 26-35 years); however, there was no significant difference between the group 36-49 years and the rest of the groups (see Table 22).

Table 21: Effects of Age on Three Course Aspects

Dependent Variables	Learner responsibility for learning		Accessing the online learning resources after the course ends		Teaching and learning aspects of the MOOC	
	F	η2	*F*	η2	*F*	η2
Age	$F(3, 1745) = 3.28^{o}$	.01	$F(3, 1739) = 8.77^{*}$	.02	$F(3, 1749) = 5.86^{\times}$	.01
Hours spent per week	$F(4, 1745) = 5.57^{*}$	.01	$F(4, 1739) = 3.64^{\times}$	.01	$F(4, 1749) = 3.45^{\times}$	.01
Confidence in learning online	$F(1, 1745) = 108.77^{*}$	.06	$F(1, 1739) = 29.92^{*}$	.02	$F(3, 1749) = 138.22^{*}$	.07
Hours spent per week x Confidence in learning online			$F(4, 1739) = 4.67^{\times}$	.01		

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

Table 22: Age Groups and Estimated Means of Five Course Aspects

Age Groups	Interaction with Teaching Staff	Feeling supported by other students	Learner responsibility for learning	Accessing the online learning resources after the course ends	Teaching and learning aspects of the MOOC
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
Under 25	3.61 (.08)	3.51 (.08)	4.62 (.04)	4.49 (.04)	4.60 (.03)
26-35	3.80 (.07)	3.51 (.07)	4.57 (.03)	4.47 (.04)	4.59 (.03)
36-49	3.60 (.06).	3.47 (.07)	4.52 (.04)	4.36 (.04)	4.51 (.03)
50 or older	3.29 (.07)	3.22 (.07)	4.49 (.04)	4.25 (.04)	4.46 (.03)

Note: Each variable was measured on a scale ranged from 1 = very unimportant to 5 = very important.

Effect of Level of Education

RQ9: To what extent does MOOC learners' level of education influence their perception of the importance of online interaction with the teaching staff or feeling supported by other learners after controlling for hours spent per week and confidence in learning online?

RQ10: To what degree does MOOC learners' level of education influence their perception of the importance of being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online?

The ninth and tenth research questions investigate the effect of MOOC learners' level of education on their perception regarding the importance of the following variables: online interaction with the teaching staff, feeling supported by other learners, being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC, after controlling for the two variables hours spent per week and confidence in learning online. To answer these two research questions, five univariate GLM tests with the highest level of education as a fixed factor and the above-mentioned variables as dependent variables in each separate test, were conducted to examine the effect of age on these five dependent variables. To account for the possible confounding of variables, the number of hours the learner spent per week engaged in the course was included as a fixed factor and learner confidence in learning online as a covariate in all of the five tests. All two-way interactions were tested for and any interaction that was not significant was removed from the final model. After conducting each of the univariate GLM tests, follow-up Bonferroni post hoc tests were conducted only for significant main effects of education to evaluate the pairwise differences among the adjusted means for the different levels of education. The follow-up

tests indicated that learners with professional/master/doctoral degree or the equivalent had the lowest means for the importance of the following four dependent variables: interaction with teaching staff online, feeling supported by other students, learner responsibility for learning, and teaching and learning aspects of the MOOC. Moreover, the level of education described by respondents as some college/bachelor's degree had the lowest mean for the importance of accessing online learning resources after the course ends (see Table 25).

Education and Interaction with Teaching Staff

As presented in Table 23, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of level of education on the importance of interaction with teaching staff was significant, $F(2, 1733) = 5.64$, $p < .01$. Follow-up tests revealed that learners in level of education professional/master/doctoral degree or equivalent placed significantly less importance on interaction with teaching staff than learners in the other two levels, some college/bachelor's degree and some high school/high school diploma/GED, but there was no significant difference between these two self-described levels of education (see Table 25).

Education and Feeling Supported by Other Students

As shown in Table 23, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of level of education on the importance of feeling supported by other students was significant, $F(2, 1727) = 6.49$, $p < .01$. Follow-up tests revealed that learners in level of education professional/master/doctoral degree or equivalent placed significantly less importance on

feeling supported by other students than learners in the other two levels, some college/bachelor's degree and some high school/high school diploma/GED, but there was no significant difference between these two levels of education (see Table 25).

Table 23: Effects of the Level of Education on Instructor and Learner Interaction

Dependent Variables	Interaction with Teaching Staff		Feeling supported by other students	
	F	η2	*F*	η2
Level of education	$F(2, 1733) = 5.64^{\times}$	.01	$F(2, 1727) = 6.49^{\times}$	.01
Hours spent per week	$F(4, 1733) = 17.18^{*}$	.04	$F(4, 1727) = 20.16^{*}$	.05
Confidence in learning online	$F(1, 1733) = 4.00^{o}$	< .01	$F(1, 1727) = .31$	.00

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

Education and Learner Responsibility for Learning

As illustrated in Table 24, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of level of education on the importance of learner responsibility for learning was significant, $F(2, 1741) = 6.94$, $p < .01$. Follow-up tests indicated no significant differences between the three levels of education (see Table 25). While controlling for the effect of the hours spent per week, the interaction between level of education and confidence in learning online on the importance of learner responsibility for learning was significant, $F(2, 1737) = 6.54$, $p < .001$.

Education and Accessing Online Learning Resources after the Course Ends

As presented in Table 24, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of level of education on the importance of accessing online learning resources after the course ends was not significant, $F(2, 1737) = 0.25$, $p > .05$.

Education and Teaching and Learning Aspects of the MOOC

As presented in Table 24, while controlling for the effect of hours spent per week and learner confidence in learning online, the main effect of level of education on the importance of teaching and learning aspects of the MOOC was not significant, $F(2, 1747) = 0.26$, $p > .05$.

Table 24: Effects of Level of Education on Three Course Aspects

Dependent Variables	Learner responsibility for learning		Accessing the online learning resources after the course ends		Teaching and learning aspects of the MOOC	
	F	η2	*F*	η2	*F*	η2
Level of education	$F(2, 1741) = 6.94^{\times}$	.01	$F(2, 1737) = 0.25$	< .01	$F(2, 1747) = .26$	< .01
Hours spent per week	$F(4, 1741) = 4.94^{\times}$	.01	$F(4, 1737) = 3.21^{\times}$	.01	$F(4, 1747) = 2.61^{o}$	.01
Confidence in learning online	$F(1, 1741) = 90.77^{*}$	.05	$F(1, 1737) = 25.64^{*}$	.02	$F(1, 1747) = 125.42^{*}$	.07
Level of education x Confidence in learning online	$F(2, 1741) = 6.88^{\times}$	.01				
Hours spent per week x Confidence in learning online			$F(4, 1737) = 4.00^{\times}$	.01		

Note: $^{o}p < .05$; $^{\times}p < .01$; $^{*}p < .001$.

Table 25: Means of Five Variables across Levels of Education

Level of education	Interaction with Teaching Staff	Feeling supported by other students	Learner responsibility for learning	Accessing the online learning resources after the course ends	Teaching and learning aspects of the MOOC
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
Some high school/high school diploma/GED	3.74 (.08)	3.61 (.08)	4.59 (.05)	4.36 (.06)	4.53 (.05)
Some college/bachelor's degree	3.64 (.04)	3.52 (.05)	4.55 (.03)	4.38 (.03)	4.55 (.03)
Professional/master/doctoral degree or equivalent	3.51 (.04)	3.37 (0.4)	4.53 (.03)	4.40 (.03)	4.53 (.02)

Note: Each variable was measured on a scale ranged from 1 = very unimportant to 5 = very important.

Chapter 6: Discussion and Conclusion

Massive open online courses (MOOCs) attract the attention of educators who desire to extend higher education to learners around the globe. MOOCs also interest learners with Internet access who can enroll at no cost and can benefit from them. However, research emphasizes the importance of understanding how learners learn in and interact with MOOC platforms and how their different backgrounds and characteristics might influence their learning experiences. For example, Sharma (2013) argues that "we need more research about how students learn in massive open online platforms, and a better understanding of how students from different academic, cultural, social, and national backgrounds fare in such spaces" (para. 3). Therefore, this study examined readiness for online learning among MOOC learners from different countries and cultures. It additionally looked at learners' online interaction experiences and satisfaction with MOOCs.

This research contributes to the field of communication by expanding the examination of the second level digital divide to include MOOC learners from different countries and cultures. It sheds light on the similarities and differences among MOOC learners from various regions and country classification with regard to their different levels of engagement with ICTs. The research also illuminates how individualism and collectivism might explain significant self-efficacy and locus of control differences among learners from different regions. Through a comparative case study design across cultural and regional contexts, this study adds depth to previous scholarship limited in its emphasis on English-language curricula offered through North American institutions.

The findings of the two surveys were presented in Chapters 4 and 5. This chapter discusses these findings in light of previous research and related theoretical frameworks

to address the research questions and proposed hypotheses. This chapter covers a discussion of the study findings and implications. It includes a consideration of the limitations of the study, recommendations for educators, educational institutions, and MOOC providers concerning issues related to designing and offering MOOCs, and suggestions for future research.

The availability of MOOCs as tuition-free courses to any learner with an Internet connection widens access to education content and gives researchers and educators the chance to investigate new course designs, delivery formats, and pedagogical methods. MOOCs draw on developments in information and communication technologies (ICTs) and online education, but they are still in the development stage. MOOCs offer educators opportunities to connect learners across the globe, but researchers (e.g., Klobas, Mackintosh, & Murphy, 2015; Ronaghi, Saberi, & Trumbore, 2015) argue that very little information is available on learners' experiences with MOOCs, in terms of what works and what does not, how educators can create more effective teaching practices for online learning communities, and learners' satisfaction with their experience. Learners' readiness for online learning is one of the factors that could influence their experience with MOOCs. Researchers (e.g., Dray et al., 2011; Hung, Chou, & Chen, 2010; Smith, Murphy, & Mahoney, 2003) noted the importance of examining learner readiness for e-learning and developed readiness scales for online learning. Therefore, this study investigated MOOC learners' readiness for online learning by surveying male and female MOOC learners who live in various countries with diverse cultural contexts. These countries also have different ICTs infrastructures and economic classifications. The learners were also diversified in their English language proficiency, the number of years they have been using computers, and the frequency of their Internet access. Additionally, the study investigated MOOC learner satisfaction with the MOOC and online interaction.

It looked at the influence of learner demographics, such as levels of education and age, on their perceptions concerning the importance of online interaction, the impact of learner confidence in learning online, and the number of hours they spent each week engaged in the MOOC. The study findings will be discussed in detail in the following sections.

DISCUSSION OF FINDINGS AND IMPLICATIONS

Online Learning Readiness

This dissertation research investigated MOOC learners' readiness for online learning across countries and various cultures. According to Akaslan and Law (2011), success in online learning emerges from a cluster of several factors and readiness is an essential one of them. Dray et al. (2011) note that online learning readiness can be determined by examining learner level of engagement with ICTs, self-efficacy, and locus of control. Based on the second-level digital divide approach and resources and appropriation theory (Hargittai, 2002; van Dijk, 2002, 2005, 2006, 2013), there are different levels of online skills among individuals who have access to the Internet and these differences can cause a digital gap. Hargittai (2002) noted that less digitally skilled users might not be able to benefit fully from the advantages that the Internet has to offer; categorical inequalities in the society can cause unequal distribution of resources and access to digital technologies (Hargittai, 2002; van Dijk, 2002, 2005). Also, the existence and spread of ICTs in any country is based on several factors, such as technical infrastructure and economic development. These factors indicate to what degree ICTs are integrated in sectors of the society in a country as well as individuals ability to own ICTs facilities (Hermeking, 2006; Billon, Marco, & Lera-Lopez, 2009; Zhong, 2011).

Therefore, this study investigated similarities and differences among MOOC learners from different regions or country classification with regard to level of engagement with ICTs, self-efficacy, and locus of control (RQ1). Data presented in Table 4 show that about 48% of respondents who participated in the online learning readiness English survey live in the North American region and nearly 94% of the online learning readiness Arabic survey participants live in Arab States. Also, the online learning readiness survey (OLRS) was conducted in English and Arabic and was sent to learners who are taking MOOCs offered in English and Arabic through MOOC providers based in the U.S (edX) and Saudi Arabia (Rwaq). Therefore, in discussing the findings of the OLRS results and their implications, I will highlight the North American and Arab States regions, within a broader discussion of regional diversity.

As illustrated in Chapter 4, the analysis of the survey results demonstrate that the effect of region on MOOC learners' ICTs engagement was significant. Learners who live in the North American regions have significantly higher levels of engagement with ICTs than learners who live in Arab States, Asia and the Pacific, and Latin American and the Caribbean regions. Learners who live in Arab States have significantly lower levels of engagement with ICTs than learners who live in the European region and significantly higher than learners who live in Latin America and the Caribbean. On the other hand, the difference between learners who live in North American and European regions was not significant and the difference between learners who live in Arab States and Asia and the Pacific was not significant. These findings indicate that the MOOC learner level of engagement with ICTs differs depending on the country they live in and most of these differences were significant.

These findings support the second-level digital divide approach and resources and appropriation theory (Hargittai, 2002; van Dijk, 2002, 2005, 2006, 2013), because they

demonstrate how MOOC learners, who all have access to the Internet, do not possess the same digital skills and how differences in ICTs diffusion can contribute to individuals' digital skills. Additionally, these findings are consistent with previous research. Mirza and Al-Abdulkareem (2011) noted that many countries within the Middle East region were reluctant to adopt the Internet broadly. On the other hand, in the U.S., for example, in 2001 more than half of the population was online ("A Nation Online," 2002). According to Hargittai (2002), the length of time people have been Internet users contributes to their digital skills and abilities to navigate the content of the Internet and therefore the time spent on the Internet is associated with users' Internet skills. Less digitally skilled users might be discouraged to use the Web, because of the challenges they encounter trying to find information on the Internet. As the findings of this study indicate, MOOC learners who live in countries that were late in adopting the Internet might have significantly lower levels of engagement with ICTs than learners in countries that were faster in adopting the Internet. One of the arguments about MOOCs is that "because MOOCs are free, anyone with an internet connection can learn valuable information from them that can make them a better, more knowledgeable person" ("The future of MOOCs," 2015). However, the study findings counter this statement, since they show how MOOC learners possess significantly different digital skills. For this reason, educators should not assume that all MOOC learners possess the same technological competence or literacy and are all able to learn and benefit from MOOCs.

The results indicate also that the effect of region on learner self-efficacy was significant. For example, learners who live in North America have significantly higher self-efficacy than learners who live in the Arab States, Europe, Asia and the Pacific, and Latin America and the Caribbean; the differences between learners who live in Arab States and the other three regions were not significant. Although the findings show that

MOOC learners' self-efficacy differs depending on the country in which they live, only learners who live in North America have higher self-efficacy. Moreover, the results indicate that the effect of region on learner locus of control was significant. For instance, learners who live in North America have significantly higher locus of control than learners who live in the Arab States, Europe, and Asia and the Pacific. Learners who live in Arab States have significantly lower locus of control than learners who live in Europe and Latin America and the Caribbean. However, the differences between learners who live in the North American and Latin American and the Caribbean regions were not significant. The difference between learners who live in Arab States and Asia and the Pacific was not significant. The findings show that MOOC learners' locus of control might differ from one another depending on the country in which they live, such as the significant difference between learners who live in North America and Arab States.

According to Dray et al., (2011), learner readiness for online learning can be examined by studying learner characteristics and engagement with ICTs. Learner characteristics can be measured by examining learner self-efficacy and locus of control. This study's findings indicate that the effects of region on learner self-efficacy and locus of control were significant. These findings are consistent with previous research. Lim's (2004) study revealed that American students had significantly higher self-efficacy than Korean students. He noted that this significant difference can be accounted for the explanation of Chen, Stevenson, Hayward, and Burgess (1995) that Asian students are affected by the authoritarian classroom context of Asian culture. A study conducted by Mueller and Thomas (2000) examined locus of control of over 1,800 university students in nine countries; it found that individualistic and collectivistic cultures contribute to individuals' locus of control. According to their study, "individualism was found to

increase the likelihood of an internal locus of control orientation ... while collectivistic cultures do not" (p. 66). Hofstede (1991) noted that

> Individualism pertains to societies in which social ties and commitments are loose. Everyone is expected to look after himself or herself and the immediate family. Collectivism, at the opposite pole from individualism, pertains to societies in which people from birth onwards are integrated into strong, cohesive ingroups which throughout a lifetime continue to protect them in exchange for unquestioning loyalty (p. 51).

Additionally, countries in the North American region, such as the U.S. and Canada are scoring high on individualism in the Hofstede's cultural dimensions model; the U.S. score is 91, which is the highest in Hofstede's model, and Canada score is 80 (The hofstede centre, n.d.; Smit, 2012). On the other hand, countries in the Arab States regions, such as Saudi Arabia and Egypt, score low on individualism, 25 for both of them (The hofstede centre, n.d.). Therefore, individualism and collectivism differences among MOOC learners from various regions could explain significant self-efficacy and locus of control differences among learners from different regions. While designing and developing MOOCs, educators should not expect that learners from individualistic and collectivistic cultures would have the same levels of self-efficacy and locus of control. Educators should consider how different cultures contribute to learners' characteristics and how to accommodate these differences as they are developing new MOOCs.

Similar to the effect of region, the results point out that the effects of country classification on MOOC learners' ICTs engagement, self-efficacy, and locus of control were significant. Learners who live in developed economies have significantly higher levels of engagement with ICTs, self-efficacy, and locus of control than learners who live in developing economies. These findings correspond to previous studies. Based on the Measuring the Information Society Report (ITU, 2014), the analysis of the ICT

development index (IDI) values shows a significant inequality between developed and developing countries. While the average IDI value of developing countries is 7.20, the average of developing countries is almost half that at 3.84 (ITU, 2014). In a study conducted by Bhuasiri, Xaymoungkhoun, Zo, Rho, and Ciganek (2012) to identify essential success factors for online learning in developing countries, they noted that "users in developing countries are not as familiar with technology as users in developed countries and will not likely see the importance of technology in education" (p. 851). In addition to the above-mentioned research, the study findings are consistent with the second-level digital divide approach and resources and appropriation theory (Hargittai, 2002; van Dijk, 2002, 2005, 2006, 2013), as they demonstrate the digital skills gap between MOOC learners who live in developed economies countries and learners who live in developing economies countries. Moreover, Hofstede (1980) noted that while industrialized rich countries scored high on individualism, developing countries scored low. His argument supports the popular belief of the positive correlation between individualism and economic development. Several studies (e.g., Hofstede, 1991; Lim, 2004; Mueller & Thomas, 2000) noted that people from individualistic cultures have higher self-efficacy and locus of control than individuals from collectivist cultures. Therefore, previous research is consistent with the study findings that learners who live in developed economies countries have significantly higher self-efficacy and locus of control than learners who live in developing economies countries. Educators should be aware of the significant differences between MOOC learners from different economic country classifications and how these differences significantly influence learners' levels of engagement with ICTs, self-efficacy, and locus of control.

This study examined also to what extent gender moderates the relationship between region and MOOC learner ICTs engagement or between country classification

and MOOC learner ICTs engagement (RQ2). For the effect of gender on the relationship between region and MOOC learner level of engagement with ICTs, the results revealed that gender had a significant effect in three regions. MOOC male learners who live in North America, Asia and the Pacific, and Latin America and the Caribbean have significantly higher levels of engagement with ICTs than female learners who live in these regions. On the other hand, there was no significant difference between male and female MOOC learners who live either in Arab States or in Europe. Concerning the effect of gender on the relationship between country classification and MOOC learner level of engagement with ICTs, the results indicate that gender did not have a significant effect. These findings are partially consistent with previous research. In the U.S., men are a little more engaged in using the Internet than women (Fallows, 2005) and females continue to be less intense and frequent users of the Internet (Ono & Zavodny, 2003). For the differences between men and women in using the Internet in Arab States, in a study conducted by Mubarak (2014) at the University of Khartoum in Sudan, she noted that repressive cultural norms hinder women's opportunities to benefit from ICTs and the stereotype of female students as less skilled than males made them less confident in themselves. So, previous research partly corresponds to this study's findings since MOOC male learners who live in North America, Asia and the Pacific, and Latin America and the Caribbean have significantly higher levels of engagement with ICTs than female learners who live in these regions. However, the study finding that there was no significant difference between male and female MOOC learners who live in Arab States is not consistent with Mubarak's (2014) research. Based on this analysis, male and female MOOC learners might have significantly different levels of engagement with ICTs based on the countries in which they live. This is an important issue that educators should consider when designing and developing MOOCs.

This study looked at the direct impact of region on MOOC learner online readiness and indirect impact through the ICT development index (RQ3). The results illustrate that region has a significant contribution to MOOC learner readiness for online learning; data presented in Table 3 show that some of the regions have higher ICT development index (IDI) values than other regions. The findings indicate that learners who live in North America have higher level of readiness for online learning than learners who live in Arab States. The impact of the IDI on the relationship between region and MOOC learner online learning readiness is positive; this means that learners who live in countries with high IDI values have higher readiness for online learning than learners who live in countries with lower IDI values. These findings are consistent with previous research, since the IDI is a composite index that combines several indicators that measure the developments in ICTs across countries (ITU, 2014); previous studies (e.g. Hargittai, 2002; van Dijk, 2002, 2005, 2006, 2013) showed a positive correlation between the availability of high levels of ICT infrastructure, access and usage and users' high Internet skills.

Regarding the effects of MOOC learner English proficiency, computer access, and frequency of Internet access on their level of engagement with ICTs (RQ4), the results demonstrate that the effects of learner English proficiency and computer access on their ICTs engagement were significant. For the English language proficiency, the survey participants reported four levels: none, knowledge of a few phrases, sufficient for limited situations, and sufficient for most situations. The results indicate that MOOC learners at the level sufficient for most situations have significantly higher levels of engagement with ICTs than learners at the other three levels. Learners at the level sufficient for limited situations have higher levels of engagement with ICTs than learners at the levels none and knowledge of a few phrases. Concerning computer access, the results revealed

that learners who have been accessing a computer for five or more years have significantly higher levels of engagement with ICTs than learners who have been accessing a computer for three to five years or two to three years. With regard to frequency of Internet access, the effect of MOOC learner Internet access on their level of engagement with ICTs was not significant. The study findings generally correspond to previous research. Elzawi and Wade (2012) noted that low English proficiency is one of the major obstacles that prevents people in Libya from utilizing online learning resources, such as Web content and software. Rhema and Miliszewska (2010) mentioned that in developing countries, language is another major barrier in adopting online learning. This study's findings also are in line with Zhong's (2011) study on the digital skills gap among adolescents, as she noted that "self-reported digital skills [are] affected by home ICT access" (p. 736). These results show that only 0.9% of the survey respondents reported accessing a computer for less than a year and none of them reported low frequency of Internet access, such as once a month or less. One of the study's implications is that new computer users or less engaged Internet users might not feel confident enough to enroll in MOOCs. Therefore, educators should consider MOOC learners' differences regarding English proficiency, computer access, and frequency of Internet access and consider offering MOOCs in different languages and finding ways to encourage and help new computer and Internet users to enroll in these courses.

Online Interaction and Satisfaction

Learner Satisfaction with Massive Open Online Courses

This study explored MOOC learners' experience with three types of online interaction and features that learners consider important and that increase their

satisfaction. The theory of independent learning and teaching and the three types of interaction model (Moore 1973, 1989) were useful in investigating the effects of learner-content interaction, learner-instructor interaction, and learner-learner interaction on learner experience and satisfaction with the MOOC. This research hypothesized that learner satisfaction with learner-content, learner-instructor, and learner-learner interaction would positively influence learner satisfaction with the MOOC (H1, H2, and H3). The study findings indicate that learner satisfaction with learner-content interaction positively influences learner satisfaction. However, learner satisfaction with learner-instructor interaction or learner-learner interaction had no effect on learner satisfaction with the MOOC. These findings are partially consistent with research conducted by Sun et al. (2008). According to their study, learner interaction with others (teachers, students, or content) did not affect online learner satisfaction with e-learning. On the other hand, this study challenges Arbaugh's (2000) assertion that there is a positive correlation between students' satisfaction with e-learning and their perceived interaction with others. These findings may indicate that, for some MOOC learners, learner interaction with teaching staff or other students is not as important to learner satisfaction as learner-content interaction.

This study also hypothesized that learner perceived usefulness of the MOOC will be positively associated with learner satisfaction with the MOOC (H4). The technology acceptance model (TAM) describes technology usage behavior and predicts to what degree people might accept technology (Davis, Bagozzi, & Warshaw, 1989; Reis, McGinty, & Jones, 2003). The TAM was useful in illuminating how individuals accept new computer-based technology, such as MOOCs, and explained how perceived usefulness of technology could encourage individuals to use it and influence their satisfaction with this technology. The study findings show that learner perceived

usefulness of the MOOC was related to learner satisfaction with the MOOC. Therefore, the more the learner perceived usefulness of the MOOC, the more satisfied he/she was with it. The results also indicate that course flexibility has a significant effect on learner satisfaction with the MOOC. This finding is in line with other studies (Arbaugh 2002; Arbaugh & Duray, 2002; Sun et al., 2008) that examined the impact of course flexibility on students' satisfaction with e-learning.

This research examined what MOOC features significantly influence online learners' satisfaction (RQ5). The study findings illustrate that perceived usefulness, teaching and learning aspects of the MOOC, and course flexibility had significant effects on learner satisfaction with the MOOC. These results are consistent with previous research that shows how these conditions are important in the context of learner satisfaction with either MOOCs (Liu et al., 2014) or typical online courses (Arbaugh 2002; Arbaugh & Duray, 2002; Davis, Bagozzi, & Warshaw, 1989; Reis, McGinty, & Jones, 2003; Sun et al., 2008). Furthermore, the learner interaction with the MOOC content variable was strongly correlated with learner satisfaction. Although this result corresponds to Arbaugh's (2000) findings, it is inconsistent with findings by Sun et al. (2008). Additionally, the interactions with teaching staff and other students variables were not significantly related to the learner satisfaction with the MOOC variable. These findings are consistent with Moore's (1973) previous discussion about interaction in distance education. He reported that millions of learners, especially adults, learn outside the classroom setting and in several situations they do not meet face-to-face with their teachers or speak directly to them.

Concerning what MOOC features are considered important and satisfactory to online learners (RQ6), the importance-satisfaction analysis shows that learners placed the highest importance and satisfaction values on teaching and learning aspects of the

MOOC, followed by learner-content interaction. These results are in line with a previous study conducted by Palmer and Holt (2009); learners also placed the lowest importance and satisfaction values on learner-learner interaction and learner-instructor interaction. Despite the fact that these findings are consistent with previous research (Palmer & Holt, 2009), they could also be due to problems with the MOOC pedagogical design or the delivery infrastructure of the MOOC platforms. According to Hart-Davidson (2014), "Most MOOC environments simply do not prioritize learner-to-learner interaction in their pedagogical design or their delivery infrastructure" (p. 218). The study findings illustrated important factors that educators might consider while developing new MOOCs to increase learners' satisfaction with these courses.

Effects of Learner Age on Perceptions of Online Interaction

This study examined the effect of age and level of education of MOOC learners on their perceptions concerning the importance of online interaction with the teaching staff, feeling supported by other learners, learner responsibility for learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC.

The study explored to what extent the age of MOOC learners influences their perceptions of the importance of online interaction with the teaching staff, feeling supported by other learners, being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online (RQ7 and RQ8). The results show that learners who are at least 50 years old, which represents nearly 24% of the participants of the online interaction and satisfaction survey respondents, gave the lowest importance values to all five above-mentioned factors.

However, of these five factors, learners who are at least 50 years old found learner responsibility for learning the most important, with a mean of 4.49 out of 5.

The results also indicate that age had a significant effect on the importance of online interaction with the teaching staff and there was a significant difference dividing those younger and older than 50 years old. Those who were at least 50 years old placed significantly less importance on interaction with teaching staff than those who were younger. The effect of hours spent per week on the importance of online interaction with the teaching staff significantly differed among the age groups. Holmberg (1995) suggested that providing useful real and simulated communication and engaging the learner in discussions, activities and decisions both to and from the learner are factors that can support learner motivation and promote learning effectiveness in distance teaching. However, in addition to Holmberg's (1995) suggestion, it is important for learners to be familiar enough with computers and the Internet to utilize computer-mediated communication effectively. Although older people can benefit from online learning (Githens, 2007), they face several challenges when using the Internet (Carter & Market, 2001). This could explain the significance between the oldest age group and the rest of the age groups regarding the importance of interaction with teaching staff. Moreover, the results of this study are consistent with the finding of Sanchez-Gordon and Luján-Mora (2013), which illustrated the web accessibility challenges of MOOCs for older learners and noted that the MOOC platforms and courses they analyzed have web accessibility difficulties that should be addressed.

Additionally, age had a significant effect on the importance of feeling supported by other learners, importance of accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC. There were significant differences between older and younger learners, particularly comparing those over 50 years old with

those 35 and younger. The age group 50 years old and older placed significantly less importance on feeling supported by other learners, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC than the two age groups of 25 years and 26-35 years. However, the age group 36-49 years did not significantly differ from the other groups. The effect of hours spent per week on the importance of feeling supported by other learners significantly differed among the age groups. Knowles (1980) argued that individuals are motivated to engage in learning when they feel a need to learn and the interaction between individuals and their environment is the central dynamic of the learning process. Also, Holmberg (1995) suggested that facilitating access to course content and making the study relevant to learners' needs can support learner motivation and promote learning effectiveness in distance teaching. However, the results indicate that learners in the youngest two age groups placed significantly more importance on factors related to these issues than learners in the oldest age group.

The results demonstrate that age had a significant effect on the importance of learner responsibility for learning and there was a significant difference only between learners in the age group 50 years old and older and the age group under 25 years. The age group 50 years old and older placed significantly less importance on feeling supported by other learners than the two age groups under 25 years and 26-35 years. Knowles (1980) argued that people start to see themselves increasingly as doers or producers rather than full-time learners, when they define themselves as adults and move toward being self-directed learners who are responsible for their own learning. However, the results of this study are consistent with Knowles' (1980) argument, as learners in the youngest age group (under 25 years) are the ones who placed significantly more importance on learner responsibility for learning than learners in the oldest age group.

The study findings illustrate how MOOC learners are from diverse age groups and have different preferences regarding online interaction with teaching staff, other learners, and course content. Educators might utilize these findings to customize online interaction among MOOC learners based on their needs and preferences instead of offering the same forms of interaction to all learners regardless of their preferences.

Effect of Learner Level of Education on Perceptions of Online Interaction

This research studied to what extent MOOC learners' level of education influences their perceptions of the importance of online interaction with the teaching staff, feeling supported by other learners, being responsible for their own learning, accessing online learning resources after the course ends, and teaching and learning aspects of the MOOC after controlling for hours spent per week and confidence in learning online (RQ9 and RQ10).

The results indicate that the level of education had a significant effect on the importance of online interaction with the teaching staff and feeling supported by other learners. There were significant differences between learners with graduate-level education compared with those at the college or high school levels, but there was no significant difference between these latter two levels of education. The level of education professional/master/doctoral degree or equivalent placed significantly less importance on interaction with teaching staff and feeling supported by other learners than the two other levels. The results of this study illustrate how learners with a higher level of education, nearly 48% of the participants of the online interaction and satisfaction survey, placed significantly less importance on interaction with the teaching staff and feeling supported by other learners than learners with lower levels of education.

The results demonstrate that the level of education had a significant effect on the importance of learner responsibility for learning. These findings are in line with a study conducted by Islam et al. (2011), who argue that "students with higher level of education tend to update their knowledge and information that can easily be gained thorough e-learning" (p. 118). The results show that the level of education had no significant effect on the importance of accessing online learning resources after the course ends or teaching and learning aspects of the MOOC. The effect of hours spent per week on the importance of learner responsibility for learning significantly differed among the levels of education. Previous studies (e.g., Islam et al., 2011) showed the significant effects of learner demographics, such as level of education, on their perceptions of online learning and interaction. The study findings are in line with previous research and indicate that MOOC learners' participation and interaction in a course might differ from one another based on their level of education. Therefore, educators should consider MOOC learners' education while designing online activities and assignments.

LIMITATIONS OF THE STUDY

This study relied on a convenience sample of MOOC learners who enrolled in courses offered by two MOOC providers. Hence, the study findings cannot be generalized to all MOOC learners. Currently, many MOOCs that are offered by universities, professors, and professionals based in various countries offer them using different MOOC platforms. Several MOOCs are offered in different languages. Therefore, it is not certain whether examining other MOOC learner populations who are taking MOOCs offered by other educators or providers or offered in other languages than English or Arabic would lead to similar results.

One of the study limitations is related to the list of countries structured through other sources. The study's two surveys were administered online using Qualtrics, an online survey software. The surveys' participants were asked about the countries in which they were born or currently live. The list of countries was added to the surveys from Qualtrics question bank. The list of countries did not include the State of Palestine. Accordingly, the number of MOOC learners who were born or live in the State of Palestine and participated in any of the two surveys is not known. In the Arabic survey, participants were given the option to add additional comments and two participants were concerned about not listing the State of Palestine in the list of countries. One of them said I am Palestinian and live in the State of Palestine; however, my country's name was not listed in the given list of countries. He also requested adding his country name to the list. The other one was concerned about listing Israel in the list of countries and not listing the State of Palestine.

In examining MOOC learners' levels of engagement with ICTs, self-efficacy, and locus of control, the online learning readiness survey was sent only once to the MOOC learners. As the survey was not sent to the learners once at the beginning of the course and once at the end of the course, the findings cannot reveal whether participating and learning through the MOOC improved their levels of engagement with ICTs, self-efficacy, and locus of control. Additionally, only the learners who enrolled in MOOCs offered in Arabic were asked about their levels of English proficiency, the number of years they have been accessing a computer, and frequency of Internet access. Learners who enrolled in the MOOCs offered in English were not asked about these three aspects. The study findings show that English proficiency and computer access have significant effects on learners' levels of engagement with ICTs. However, the findings cannot

indicate whether these two aspects, English proficiency and computer access, have the same significant effects on learners who took MOOCs in English.

Another limitation is that this study focused on examining learners' experiences with certain course aspects and their satisfaction with them. One of these aspects is related to online interaction with teaching staff, other learners, and course content; another two aspects are course flexibility and provided usefulness. However, the study cannot indicate the effects of other important course aspects, such as perceived ease of use and course quality. Additionally, this study focused only on the effects of two MOOC learner demographics, age and level of education. The results show that they had significant effects on learners' perceptions regarding several course aspects. However, the study did not investigate whether the effects of other demographics, such as primary occupation and income, are significant.

RECOMMENDATIONS FOR EDUCATORS AND RESEARCHERS

Many educators are interested in utilizing MOOCs to offer quality education to learners with Internet access across the globe. However, this study's findings indicate significant differences among MOOC learners, which educators should investigate in order to help learners benefit from MOOCs. For example, the findings showed that MOOC learners from some regions have significantly higher levels of engagement with ICTs than learners from other regions. This is an important issue that educators should consider. For instance, MOOC learners might need to have high levels of digital skills to be able to interact effectively through MOOC platforms. In examining learners' levels of engagement with ICTs, the study survey participants were asked about their technology capabilities and confidence to accomplish advanced digital tasks, such as downloading

and installing new software and using social networking sites. Some of the learners were not confident enough to accomplish some of these digital tasks. Therefore, it is essential for educators to assess learners' digital skills before enrolling them in MOOCs that require advanced digital skills. Educators could also offer learners prerequisite courses to teach them the digital skills that they will need to benefit from MOOCs and be able to interact online effectively. Based on this study findings, one of the factors that can help educators predict learners' digital skills is considering the country in which they live. The study showed that learners who live in regions like North America or Europe have significantly higher levels of engagement with ICTs than learners who live in regions such as Arab States or Latin America and the Caribbean. Additionally, learners who live in countries classified as developed economies have significantly higher levels of engagement with ICTs than learners who live in countries classified as developing economies. Therefore, paying attention to the countries where learners live can help educators predict their levels of engagement with ICTs.

In addition to learners' digital skills, their self-efficacy and locus of control are two essential characteristics that contribute to learners' readiness for online learning and educators should give attention to them. In examining learners' self-efficacy and locus of control, the survey participants were asked several questions to assess these two characteristics. For example, they were asked to what extent they are comfortable expressing their opinions in writing to others, working in groups, organizing their time and regulating their behavior to complete course requirements. The study results illustrate that MOOC learners from some regions have significantly higher self-efficacy and locus of control than learners from other regions. In fact, individualistic and collectivistic cultures contribute to learners' self-efficacy and locus of control. Therefore, educators should take into consideration learners' cultures in designing online interaction activities

and developing course assignments. Educators should design the online activities assignment in ways that can improve learners' confidence to express their opinions and respond to other learners' ideas and help them to organize their time and regulate their behavior to complete course requirements. Educators can also offer prerequisite courses that improve learners' communication skills and awareness of similarities and differences in cross-cultural communication.

The results show that there are several groups of learners who have significantly higher levels of ICTs than other groups. For example, learners who live in countries that rank higher on the ICT development index (IDI) have significantly higher levels than learners who live in countries that have low IDI ranks; learners who have been using a computer for five or more years have higher levels than learners who have been using a computer for three to five or less years; learners at high English proficiency levels have higher levels than learners with low levels; and in several regions male MOOC learners have higher levels than female learners. Additionally, none of the survey participants reported accessing a computer for less than a year. All these factors are essential ones for educators to consider. As I mentioned previously, educators can offer prerequisite courses to enhance learners' digital skills. Also, educators and researchers should work with the developers of the MOOC platforms to simplify the graphical user interfaces, so learners with limited digital skills can navigate them easily. Educators should consider offering MOOCs in different languages and translating the course materials.

The study findings illustrate generally how learners emphasized the importance of aspects related to teaching and learning, such as relating what is learned to issues in the real world and making connections to existing knowledge or experience. Indeed, some of the learners placed higher values on these aspects than on interaction with teaching staff or feeling supported by other learners. Therefore, it is very important that educators focus

on providing enough course materials and make sure that learners are allowed to access online learning resources after the course ends.

The results showed that learner age and level of education have significant effects on learner perception concerning the importance of several course aspects. For instance, learners who are young or have low levels of education valued the importance of interaction with teaching staff or feeling supported by other learners more than the learners who are older or have higher levels of educations. These findings suggest that educators should customize the three types of course interactions, learner-instructor interaction, learner-learner interaction, and learner-content interaction, based on learners' preferences. This could improve online communication and interaction between learners and teaching staff and other learners. Learners who are mainly interested in the course content can also access the course resources without being asked to interact with the teaching staff or other learners. These types of customization could really improve MOOC learners' and instructors' experiences.

SUGGESTIONS FOR FURTHER RESEARCH

This study relied on surveying learners who were taking MOOCs offered by two MOOC providers based in the U.S. and Saudi Arabia. These MOOCs were offered in either English or Arabic. Most of the surveys' participants live in countries classified as developed economies or developing economies. Many of the participants live either in the North American or Arab States region. Therefore, it is important for researchers to replicate the same study among MOOC learners from different backgrounds and examine whether they lead to the same results. Researchers can consider conducting the same study among different MOOC learners who: speak languages other than English and

Arabic, take MOOCs offered by providers based in countries other than the U.S. and Saudi Arabia, live in countries classified economies in transition, and live in other regions, such as the Commonwealth of Independent States.

One of the studies that examined learners' readiness for online learning looked also at learners' motivation for academic learning. Further research should investigate whether there is a positive correlation between learner readiness for online learning and motivation for academic learning. Additionally, the platforms of the MOOC providers are relatively new and have different graphical user interfaces. Further research should examine how learners are interacting with the teaching staff, each other, and course content using these interfaces, navigating these platforms, and to what extent they are satisfied with and can easily use these interfaces and platforms.

This study found that learner-learner interaction and learner-instructor interaction had no effect on learner satisfaction with the MOOC, which is consistent with some previous studies about e-learning and inconsistent with others. Therefore, further research is needed to determine whether these two types of interaction increase learner satisfaction with MOOCs. This study's findings showed the significant effects of learners' demographics, age and level of education, on their perceptions concerning several course aspects. Hence, further studies might incorporate the effect of other demographic variables such as primary occupation and income. Further research might also identify the effect of learner confidence in learning through online courses and the number of hours the learner spend per week engaged in the MOOC on learners' perceptions regarding the importance of online interaction with teaching staff, other learners, and course content.

Appendices

APPENDIX A – ONLINE LEARNING READINESS SURVEY

The following questions are specially designed to better understand students' learner characteristics and technology capabilities.

Please answer the following questions as a current learner in a MOOC:

	Strongly Disagree	Disagree	Agree	Strongly Agree
I am confident in my ability to excel in an online program.	○	○	○	○
I believe I am responsible for my own education; what I learn is ultimately my responsibility. For example, I am responsible for communicating with my professor when I have difficulty understanding, obtaining answers to questions I might have about assignments, material, and content, etc.	○	○	○	○
I am comfortable working in alternative learning environments. For this question, alternative learning environments are defined as spaces outside of the traditional classroom such as library, online, home, etc.	○	○	○	○
I am comfortable expressing my opinion in writing to others.	○	○	○	○
I am able to express my opinion in writing so that others understand what I mean.	○	○	○	○
I work well in a group. (For example, I am an active communicator in a group, I contribute my fair share in a group, etc.)	○	○	○	○
I am good at completing tasks independently.	○	○	○	○
I am comfortable responding to other people's ideas.	○	○	○	○
I give constructive and proactive feedback to others even when I disagree.	○	○	○	○
I organize my time to complete course requirements in a timely manner.	○	○	○	○
I regulate and adjust my behavior to complete course requirements.	○	○	○	○
I understand the main ideas and important issues of readings without guidance from the	○	○	○	○

instructor. (For example, I can read for comprehension without guided questions from the instructor)				
I achieve goals I set for myself.	○	○	○	○
When I have to look up information on the Internet for any reason, I am comfortable with the task.	○	○	○	○
When reviewing information on the Web, I am confident that I am aware of author bias and point of view.	○	○	○	○
When asked to use social networking sites such as Facebook, MySpace, Flickr, Classmates.com, Travellerspoint, Twitter, or others like this, I feel confident using these tools.	○	○	○	○
When asked to download and install new software on my computer I feel anxious about my ability to complete the task.	○	○	○	○
When asked to download audio or video from email and view or listen to it on my computer (e.g. files sent from someone else) I feel anxious about my ability to complete the task.	○	○	○	○
When asked to find and view video on the Internet (e.g., YouTube, MSNC, CNN, The Economist, etc.) I feel confident that I can find and view the video.	○	○	○	○
When asked to find and listen to audio on the Internet (e.g., live radio broadcasts or music stations, or archived music or podcasts), I feel anxious about my ability to complete the task.	○	○	○	○
When asked to find and read articles or newspapers on the Internet I feel comfortable in my ability to successfully complete the task.	○	○	○	○
I believe that I will continue to have daily access to a computer, the Internet and the software required in order to complete assignment for as long as needed to complete this MOOC.	○	○	○	○

Please answer the following questions as a current learner in a MOOC:

	Strongly Disagree	Disagree	Agree	Strongly Agree
The advantages of taking this course online, such as availability and convenience, outweigh disadvantages such as lack of face-face interaction with professor and peers.	○	○	○	○
I was able to track down online information in this subject area and use it effectively.	○	○	○	○
I am satisfied with the course.	○	○	○	○

- How often do you access the Internet?
  - Several times a day
  - Every day
  - Several times a week
  - Once a week
  - Once a month or less

- How long have you been using computers in general?
  - Less than a year
  - Two to three years
  - Three to five years
  - Five or more years

- In which of the following settings do you most frequently use a computer/laptop/tablet to access the Internet?
  - at home
  - at school or work
  - cybercafé or other setting open to the public
  - at a friend's home
  - library

- What is your first or native language? [write in]

- What is your proficiency with the English language?
  - None
  - Knowledge of a few phrases
  - Sufficient for limited situations
  - Sufficient for most situations
  - Native English speaker or equivalent

- What country do you live in? [dropdown menu]

- What is your highest level of education?
  - Did not attend school
  - Some primary schooling
  - Elementary, primary school, or equivalent
  - Junior high, middle school, lower secondary school,
  - High school, upper secondary school, or equivalent
  - Technician's diploma, basic technical/vocational
  - Higher technical/vocational education, associate's degree, or equivalent
  - Bachelor's degree, first university cycle, or equivalent
  - Professional degree, master's degree or equivalent
  - PhD/doctoral degree or equivalent

- In what year were you born?

- What is your primary occupation?
  - High school student
  - College/university student
  - Graduate student
  - None
  - Part-time working professional
  - Full-time working professional
  - Retiree
  - Other (please describe):

- Please select your gender:
  - Female
  - Male

- What is your monthly income?
  - Less than 1000
  - 1,000 - 4,999
  - 5,000 - 9,999
  - 10,000 - 14,999
  - 15,000 - 19,999
  - 20,000 - 29,999
  - 30,000 - 39,999
  - More than 40,000
  - Unemployed
  - I prefer not to mention

- What subject are you studying?

- On average, how many hours per week did you spend engaged in this MOOC?

- Less than 2
- 2-4
- 5-7
- 8-10
- More than 10

- Additional Comments:

APPENDIX B – ONLINE LEARNING READINESS SCALE AND SUBSCALES

Online Learning Readiness (OLR)

	Information and Communication Technologies (ICTs) Engagement Subscale	
OLR_1	ICTs_1	When I have to look up information on the Internet for any reason, I am comfortable with the task.
OLR_2	ICTs_2	When reviewing information on the Web, I am confident that I am aware of author bias and point of view.
OLR_3	ICTs_3	When asked to use social networking sites such as Facebook, MySpace, Flickr, Classmates.com, Travellerspoint, Twitter, or others like this, I feel confident using these tools.
OLR_4	ICTs_4	When asked to download and install new software on my computer I feel anxious about my ability to complete the task.
OLR_5	ICTs_5	When asked to download audio or video from email and view or listen to it on my computer (e.g. files sent from someone else) I feel anxious about my ability to complete the task.
OLR_6	ICTs_6	When asked to find and view video on the Internet (e.g., YouTube, MSNC, CNN, The Economist, etc.) I feel confident that I can find and view the video.
OLR_7	ICTs_7	When asked to find and listen to audio on the Internet (e.g., live radio broadcasts or music stations, or archived music or podcasts), I feel anxious about my ability to complete the task.
OLR_8	ICTs_8	When asked to find and read articles or newspapers on the Internet I feel comfortable in my ability to successfully complete the task.
OLR_9	ICTs_9	I believe that I will continue to have daily access to a computer, the Internet and the software required in order to complete assignment[5] for as long as needed to complete this MOOC.

[5] The word "assignment," without the plural "s," was a typographical error in the original OLRS.

Self-Efficacy Subscale

OLR_10	SE_3	I am comfortable expressing my opinion in writing to others.
OLR_11	SE_4	I am able to express my opinion in writing so that others understand what I mean.
OLR_12	SE_5	I work well in a group. (For example, I am an active communicator in a group, I contribute my fair share in a group, etc.)
OLR_13	SE_6	I am good at completing tasks independently.
OLR_14	SE_7	I am comfortable responding to other people's ideas.
OLR_15	SE_8	I give constructive and proactive feedback to others even when I disagree.

Locus of Control Subscale

OLR_16	LC_1	I organize my time to complete course requirements in a timely manner.
OLR_17	LC_2	I regulate and adjust my behavior to complete course requirements.
OLR_18	LC_3	I understand the main ideas and important issues of readings without guidance from the instructor. (For example, I can read for comprehension without guided questions from the instructor)
OLR_19	LC_4	I achieve goals I set for myself.
OLR_20		I am confident in my ability to excel in an online program
OLR_21		I believe I am responsible for my own education; what I learn is ultimately my responsibility. For example, I am responsible for communicating with my professor when I have difficulty understanding, obtaining answers to questions I might have about assignments, material, and content, etc.

APPENDIX C – A COMPLETE LIST OF THE PARTICIPANTS' COUNTRIES

English Survey (edX)			IDI R	IDI V	Reg	CC	Arabic Survey (Rwaq)			IDI R	IDI V	Reg	CC
Country	Freq.	%					Country	Freq.	%				
United States	850	40.8	15	8.19	N.Am.	DE1	Saudi Arabia	183	27.0	41	7.05	AS	DE2
India	181	8.7	131	2.69	AsPac	DE2	Egypt	161	23.7	100	4.40	AS	DE2
Brazil	77	3.7	61	6.03	LAC	DE2	Syria	73	10.8	117	3.48	AS	DE2
United Kingdom	69	3.3	4	8.75	EU	DE1	Morocco	42	6.2	99	4.47	AS	DE2
Canada	56	2.7	23	7.76	N.Am.	DE1	Yemen	42	6.2			AS	DE2
Spain	52	2.5	26	7.66	EU	DE1	Algeria	33	4.9	113	3.71	AS	DE2
Australia	46	2.2	13	8.29	AsPac	DE1	Jordan	32	4.7	92	4.75	AS	DE2
Mexico	46	2.2	95	4.68	LAC	DE2	Sudan	21	3.1	126	2.93	AS	DE2
Germany	41	2.0	14	8.22	EU	DE1	Israel	13	1.9	35	7.19	EU	DE2
China	40	1.9	82	5.05	AsPac	DE2	Oman	9	1.3	54	6.33	AS	DE2
Russian Federation	37	1.8	45	6.91	CIS	ET	Lebanon	7	1.0	56	6.29	AS	DE2
Netherlands	32	1.5	8	8.53	EU	DE1	Libya	7	1.0			AS	DE2
Colombia	25	1.2	75	5.32	LAC	DE2	United Arab Emirates	7	1.0	32	7.32	AS	DE2
Italy	24	1.1	38	7.12	EU	DE1	Tunisia	6	0.9	93	4.73	AS	DE2
Pakistan	23	1.1	143	2.24	AsPac	DE2	Iraq	5	0.7				
France	21	1.0	17	8.12	EU	DE1	Qatar	5	0.7	31	7.44		
Greece	18	0.9	39	7.09	EU	DE1	Bahrain	4	0.6	27	7.63	AS	DE2
Belgium	15	0.7	21	7.88	EU	DE1	Mali	4	0.6	145	2.22	AF	DE2
Ukraine	15	0.7	79	5.23	CIS	ET	Bangladesh	2	0.3	144	2.22	AsPac	DE2
Philippines	13	0.6	98	4.57	AsPac	DE2	Chad	2	0.3	167	1.17	AF	DE2
South Africa	13	0.6	88	4.90	AF	DE2	Eritrea	2	0.3	166	1.22	AF	DE2
Argentina	12	0.6	52	6.40	LAC		Kuwait	2	0.3	46	6.83		DE2

Poland	12	0.6	44	6.91	EU	DE1	Liberia	2	0.3	155	1.86	AF	DE2
Ecuador	11	0.5	90	4.81	LAC	DE2	Afghanistan	1	0.1	156	1.83	AsPac	
Egypt	11	0.5	100	4.40	AS	DE2	Ethiopia	1	0.1	165	1.45	AF	DE2
Peru	11	0.5	104	4.26	LAC	DE2	France	1	0.1	17	8.12	EU	DE1
Iran	10	0.5	91	4.79	AsPac	DE2	Germany	1	0.1	14	8.22	EU	DE1
Portugal	10	0.5	43	6.93	EU	DE1	Italy	1	0.1				
Venezuela	10	0.5	72	5.48	LAC	DE2	Japan	1	0.1	11	8.47	AsPac	DE1
Vietnam	10	0.5			AsPac	DE2	Malaysia	1	0.1	64	5.90	AsPac	DE2
Czech Republic	9	0.4	34	7.21	EU	DE1	Mauritania	1	0.1	150	2.07	AS	DE2
Denmark	9	0.4	2	8.88	EU	DE1	Niger	1	0.1			AF	DE2
Malaysia	9	0.4	64	5.90			Serbia	1	0.1	51	6.45		
Singapore	9	0.4	19	8.08	AsPac	DE2	Somalia	1	0.1			AF	DE2
Taiwan	9	0.4				DE2	Thailand	1	0.1	74	5.36	AsPac	DE2
Thailand	9	0.4	74	5.36	AsPac	DE2	United States	1	0.1	15	8.19	N.Am.	DE1
Hungary	8	0.4	48	6.82	EU	DE1	Zimbabwe	1	0.1	127	2.90	AF	DE2
Ireland	8	0.4	22	7.82	EU	DE1							
Israel	8	0.4	35	7.19	EU	DE2							
Japan	8	0.4	11	8.47	AsPac	DE1							
New Zealand	8	0.4	16	8.14	AsPac	DE1							
Sweden	8	0.4	5	8.67	EU	DE1							
Austria	7	0.3	25	7.67	EU	DE1							
Bangladesh	7	0.3	144	2.22	AsPac	DE2							
Chile	7	0.3	55	6.31	LAC	DE2							
Romania	7	0.3	59	6.11	EU	DE1							
South Korea	7	0.3	1	8.93	AsPac	DE2							
Costa Rica	6	0.3	57	6.20	LAC	DE2							
Indonesia	6	0.3	108	3.94	AsPac	DE2							
Norway	6	0.3	10	8.49	EU	DE1							
Switzerland	6	0.3	7	8.56	EU	DE1							
Turkey	6	0.3	69	5.58	EU	DE2							

Algeria	5	0.2	113	3.71	AS	DE2
Croatia	5	0.2	42	7	EU	DE1
El Salvador	5	0.2	106	4.20	LAC	DE2
Finland	5	0.2	12	8.36	EU	DE1
Latvia	5	0.2	37	7.16	EU	DE1
Lithuania	5	0.2	40	7.08	EU	DE1
Morocco	5	0.2	99	4.47	AS	DE2
Bulgaria	4	0.2	50	6.52	EU	DE1
Estonia	4	0.2	20	8.05	EU	DE1
Ghana	4	0.2	109	3.90	AF	DE2
Slovenia	4	0.2	33	7.23	EU	DE1
Bolivia	3	0.1	107	4.08	LAC	DE2
Cameroon	3	0.1	147	2.19	AF	DE2
Honduras	3	0.1	120	3.33	LAC	DE2
Nigeria	3	0.1	134	2.61	AF	DE2
United Arab Emirates	3	0.1	32	7.32	AS	DE2
Barbados	2	0.1	29	7.57	LAC	ET
Belarus	2	0.1	36	7.18	CIS	ET
Dominican Republic	2	0.1	103	4.26	LAC	DE2
Georgia	2	0.1	78	5.25	CIS	ET
Iceland	2	0.1	3	8.86	EU	DE1
Kenya	2	0.1	124	3.02	AF	DE2
Nepal	2	0.1	136	2.59	AsPac	DE2
Other	2	0.1				
Serbia	2	0.1	51	6.45	EU	ET
Syria	2	0.1	117	3.48	AS	DE2
Tanzania	2	0.1	157	1.82	AF	DE2
Trinidad and Tobago	2	0.1	70	5.57	LAC	DE2

Tunisia	2	0.1	93	4.73	AS	DE2
Uruguay	2	0.1	49	6.70	LAC	DE2
Afghanistan	1	<.01	156	1.83	AsPac	
Albania	1	<.01	94	4.73	EU	ET
Angola	1	<.01	140	2.32	AF	DE2
Armenia	1	<.01	76	5.32	CIS	ET
Azerbaijan	1	<.01	67	5.79	CIS	ET
Bahamas	1	<.01			LAC	
Bosnia and Herzegovina	1	<.01	77	5.28	EU	ET
Brunei Darussalam	1	<.01	71	5.53	AsPac	DE2
Burma/Myanmar	1	<.01	142	2.27	AsPac	DE2
Cuba	1	<.01	129	2.79	LAC	DE2
Ethiopia	1	<.01	165	1.45	AF	DE2
Guatemala	1	<.01	121	3.26	LAC	DE2
Iraq	1	<.01				DE2
Jamaica	1	<.01	105	4.23	LAC	DE2
Jordan	1	<.01	92	4.75	AS	DE2
Kazakstan	1	<.01				
Kyrgyzstan	1	<.01	97	4.62	CIS	ET
Macedonia	1	<.01	60	6.07	EU	ET
Moldova	1	<.01	66	5.81	CIS	ET
Mongolia	1	<.01	84	5.00	AsPac	
Montenegro	1	<.01	65	5.90	EU	ET
Namibia	1	<.01	118	3.41	AF	DE2
Nicaragua	1	<.01	123	3.04	LAC	DE2
Oman	1	<.01	54	6.33		
Qatar	1	<.01	31	7.44	AS	DE2
Saudi Arabia	1	<.01	41	7.05	AS	DE2
Senegal	1	<.01	132	2.68	AF	DE2

Slovakia	1	<.01			EU	DE1
Sudan	1	<.01	126	2.93	AS	DE2
Uganda	1	<.01	149	2.14	AF	DE2
Zambia	1	<.01	153	2.04	AF	DE2

Note. Table 3 has only a list of the countries where several survey participants live; however, Appendix C has a list of all the countries including the ones where only one survey participant lives.

List of abbreviations used in this table: Frequency = Freq., Percentage = %, IDI Rank = IDI R, IDI Value = IDI V, Region = Reg, Country Classification = CC, Developed economies = DE1, Developing economies = DE2, Economies in transition = ET, Africa = AF, Arab States = AS, Asia and the Pacific = AsPac, Commonwealth of Independent States = CIS, Europe = EU, Latin America and the Caribbean = LAC, and North America = N.Am.

IDI ranks and values of few countries, such as Yemen, Vietnam, Taiwan, Somalia, Niger, Libya, Kazakstan, and Iraq, are not available in the Measuring the Information Society Report 2015 ("Measuring the Information Society," 2015).

APPENDIX D – SATISFACTION AND DEMOGRAPHICS SURVEY

Please rate the importance of the following features of this MOOC:

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important
Interacting online with teaching staff.					
Online, students supported one other and tried to give help when it was needed.					
Organizing and being responsible for your own learning.					
Relating what is learnt to issues in the wider world.					
Having work that helps make connections to existing knowledge/experience.					
Being able to access online/digital learning resources after the course ends.					

Please rate your satisfaction with the following features of this MOOC:

	Very Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Very Satisfied
Interacting online with teaching staff.					
Online, students supported one other and tried to give help when it was needed.					
Organizing and being responsible for your own learning.					
Relating what is learnt to					

issues in the wider world.
Having work that helps make connections to existing knowledge/experience.
Being able to access online/digital learning resources after the course ends.

Please indicate the extent to which you agree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
This course supported my ability to think deeply about ideas and to solve problems.					
The advantages of taking this course online outweigh any disadvantages					
I am dissatisfied with the course					
Taking this course online allowed me to take a course I would otherwise have to miss					
I am confident of my ability to learn through online courses.					
I am satisfied with the course					

- On average, how many hours a week did you spend engaged in this online course?

- Less than 2
- 2–4
- 5–7
- 8–10
- More than10

- Please indicate your age:

- Under 25 years old
- 26–35 years old
- 36–49 years old

- 50 years old or older

- What is your primary occupation?

- None,
- High school student
- College/university student
- Graduate student
- Part-time working professional
- Full-time working professional
- Self-employed contract worker, or freelancer
- Retiree
- Unemployed
- Other (please specify):

- What is your highest level of education?

- Did Not Complete High School
- High School/GED
- Some College
- Bachelor's Degree
- Professional degree, master’s degree, or equivalent
- PhD/Doctoral degree or equivalent

APPENDIX E - VARIABLES AND QUESTIONNAIRE ITEMS OF THE ONLINE INTERACTION AND SATISFACTION SURVEY

Variables	Questionnaire Items
Interaction with teaching staff	- Interaction with teaching staff online
Feeling supported by other students	- Feelings of support and assistance from other students in the course
Learner responsibility for learning	- Organizing and being responsible for my own learning
Accessing online learning resources after the course ends	- Being able to access online/digital learning resources after the course ends
Teaching and learning aspects of the MOOC	- Relating what is learned to issues in the real world - Making connections to existing knowledge/experience
Hours spent per week	- Number of hours learner spent per week engaged in the online course
Learner confidence in learning online	- Learner confidence in learning through online courses
Level of education	- Highest level of education

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Vita

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